

SUBSTITUTE SPECIFICATION
(MARK-UP & CLEAN VERSION)

& SUBSTITUTE DRAWINGS

FILED IN PARENT APPLICATION

SUBSTITUTE SPECIFICATION

Docket No. **0317MH-23513**

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN that I, **DANIEL A. HENDERSON**, have invented new and useful improvements in a

**METHOD AND APPARATUS FOR IMPROVED PERSONAL COMMUNICATION
DEVICES AND SYSTEMS**

of which the following is a specification:

1 **CROSS-REFERENCE TO RELATED APPLICATIONS**
2

3 This Application claims the benefit of the filing date under 35 USC §§119 and/or
4 120, and 37 CFR §§1.60 and 1.78 to the following U.S. and U.S. provisional patent
5 applications, and is a continuation-in-part of the U.S. patent application:

6 1. U.S. provisional patent application serial no. 60/005,029, filed on October
7 6, 1995, entitled "Method and Apparatus for Improved Paging Receiver and System";
8 and

9 2. U.S. patent application serial no. 08/177,851, filed on January 5, 1994,
10 entitled "Method and Apparatus for Enhancing the Efficient Communication of
11 Information in an Alphanumeric Paging Network" now United States Patent No.
12 6,278,862B1.

BACKGROUND OF THE INVENTIONS

1. Field of the Inventions:

These inventions relate in general to communications systems and in particular to communications systems which include paging devices, cellular networks, and techniques for constructing and maintaining databases.

2. Description of the Prior Art:

Numerous companies are attempting to improve the manner in which people communication over wireless systems. The inventions address many deficiencies in the prior art systems.

The following discussion is specifically related to stored voice paging receivers and paging systems.

In stored voice paging receivers it is possible to receive voice messages which may be heard by a called party. In the prior art systems is shown a method in which voice messages may be stored at a paging center from a calling party and then the message may be transmitted to a paging receiver. These systems typically include pager ID control data along with any voice message for playback through a code c unit at the paging receiver. The codec converts the data received into an audio reproduction of the calling parties voice message that may be heard from a speaker or sound output device in the paging receiver.

Such devices are useful in that the called party may have a voice message delivered to them rather than having to call in to a message center or voice mail center.

1 However, in part, the popularity of such devices has been limited in that there is
2 no means for preventing other people to whom messages are not intended from hearing
3 voice messages of a personal or confidential nature if the message is replayed by the
4 recipient in their presence.

5
6 It is difficult for the called party to ascertain the identity of the calling party prior to
7 playing the message received to know who is calling prior to broadcasting the message
8 in the presence of others in the nearby area. To review a stored message the user was
9 required to press play and the voice message was annunciated from an integrated
10 speaker in a communication device. This was impractical for a called party that was
11 engaged in a meeting that wanted to discretely listen to an urgent message without
12 having to leave or have other persons hear the message. In addition the previous stored
13 voice paging receivers gave no visual indication of who was calling.

14
15 The previous stored voice paging receivers stored messages received based on
16 the time the messages were received. This required that the messages had to be
17 reviewed in the same order regardless of the possibility that an urgent message may not
18 be heard until the very end of message review. This was very inconvenient if the
19 message required a prompt reply from the called party. In US 5,153,579 issued to
20 Bennett et al. is described a method of fast forwarding through messages stored
21 chronologically. This method, though useful, requires a user to sequentially listen to
22 parts of all messages preceding a possible urgent message received.

23
24 Paging networks allow for a limited amount of numeric or alphanumeric data to
25 be exchanged between a page-originating communicant and a page-receiving
26 communicant. Frequently, the page-originating communicant utilizes a telephone which
27 has a number which is not familiar to the page-receiving communicant. The page is
28 transmitted in the form of a page announce, and numeric or alphanumeric which is
29 displayed on the display of the portable paging device. Under these circumstances, the

1 page-receiving communicant is unable to ascertain the identity of the page-originating
2 communicant.

3
4 This situation is undesirable, since the page-receiving communicant may ignore
5 or defer returning the telephone call, under the mistaken belief that the page-originating
6 communicant is an unknown entity. This presents problems for paging networks,
7 particularly paging networks which include the transmission of only numeric data.

8
9 In addition, in stored voice paging receivers there is no ability to sort through or
10 organize voice messages except to listen to them sequentially. This can be inconvenient
11 for the called communicant as they may want to skip certain messages until later, but
12 must listen to at least part of all of each message as the voice data cannot be displayed.

13
14 One particular problem with conventional paging systems using message center
15 devices is the requirement that a caller must manually enter their call back telephone
16 number. One such example of a manual entry system is disclosed fully in US 4,172,969
17 issued to Levine et al, US 4,072,824 issued to Phillips, and also US 4,103,107 issued to
18 D'Amico et al. This can be cumbersome particularly if the calling party wishes to also
19 leave a voice message or send some other message data such as a facsimile. In
20 addition it is especially difficult for a calling party to enter an alphanumeric message
21 during manual entry as a great majority of communications over the PSTN originate
22 from devices with standard numeric keypads that generate DTMF signals. One invention
23 which attempts to address the problem of alphanumeric entry by a telephone set is US
24 4,918,721 issued to Hashimoto. However such an approach is still cumbersome to use
25 and is time consuming for the calling party. As well, the longer it takes for a calling party
26 to enter caller identifying information, the less time a message center at the called party
27 location is available to accept other calls. The inventive concepts herein attempt to
28 resolve these and other problems.

29 SUMMARY OF INVENTIONS

1
2 The preferred application is directed to the following inventive concepts:
3

4 1. Voice Paging System and Device which utilizes caller ID (CID) from an
5 originating central office as textual identifying data and generates prestored audio alert
6 prior to annunciation of a corresponding voice message from calling party. See **Figure**
7 **4a**. CID could be fax header as in **Figures 6a** and **6b**.
8

9 2. Alternate embodiment of the above where the entry of PIN is required to
10 play back messages from a selected group of callers or for messages of confidential
11 nature. See **Figure 4b**.
12

13 3. Alternate embodiment of the above where DTMF audio signals and voice
14 message is received. The device has a DTMF tone decoder generates corresponding
15 textual data record and decoded digits for display. A text to speech synthesis can be
16 achieved prior to annunciation of message. In another embodiment, the received DTMF
17 signals could be used to generate call back dial signals. See **Figure 4c**.
18

19 4. Alternate embodiment of the above where the CID data could be applied
20 to text to speech unit to annunciate CID data prior to the received voice message. See
21 **Figure 4d**.
22

23 5. Alternate embodiment where device has three modes of operation,
24 namely, announce, silent and broadcast mode.
25

26 6. Alternate embodiment where device has sound input means to ack-back
27 to caller. See **Figure 7b**. The sound input means is used to prestore voice response
28 messages for ack-back which is an improvement over prior art. See **Figure 7a**.
29

1 In one of the preferred embodiments is further shown a novel means in which
2 voice messages received may be selectively broadcast or heard confidentially based
3 upon the caller identifying data received.
4

5 The stored voice communication device described herein includes a method of
6 selectively determining how voice messages are stored and annunciated using source
7 identifier information, a comparator in the communication device and called party
8 preferences for annunciation determined by a called party.
9

10 Another object is to provide a stored voice communication device which shows a
11 method of converting caller identifying information into audible speech signals for a
12 called party.
13

14 Another object is to provide an improved stored voice communication device that
15 includes a method of transmitting voice message data with source identifier information.
16

17 Another improvement is to provide a more efficient method of fastforwarding
18 and reversing through messages received in such a device than in the prior art.
19
20
21

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the inventions are set forth in the appended claims. The inventions themselves, however, as well as a preferred modes of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1a shows the prior art stored voice paging receiver.

Figure 1b shows an improved stored voice paging receiver with a text-to-speech means and a display input/output means to annunciate and/or display caller identification data associated with a particular voice message received.

Figure 1c shows an improved stored voice paging receiver with a sound input means, a coincidence detector, a display output means, a detachable input means, and a DTMF tone decoder means.

Figure 1d shows an improved non-display autodialing type paging receiver with text to speech generator and DTMF tone decoder.

Figure 2a shows a block diagram of a paging system described herein that has a messaging center at the called party office.

Figure 2b shows a block diagram of a paging system described herein that has a messaging center such as a voice mail center at the telephone office.

Figure 3a shows the prior art method of transmitting a voice message to a stored voice paging receiver.

1
2 **Figure 3b** shows an improved method of transmitting a voice message to a
3 stored voice paging receiver along with caller identifying data according to one
4 embodiment of the invention.

5
6 **Figure 4a** is a flowchart of one embodiment of the invention in which caller id
7 data is applied to a coincidence detector and display within a stored voice paging
8 receiver to generate a prestored audio alert signal.

9
10 **Figure 4b** is a flowchart of one embodiment of the invention in which caller id
11 and additional data entered by the caller using DTMF entry is sent with a voice message
12 to a stored voice paging receiver with a text to speech alerting means and/or display
13 means.

14
15 **Figure 4c** is a flowchart of one embodiment of the invention in which canned
16 display alerts can be generated and improved dial signal generation can be employed in
17 an improved stored voice pager.

18
19 **Figure 4d** is a flowchart of another embodiment of the invention.

20
21 **Figure 4e** is a flowchart of one embodiment of the invention in which a stored
22 voice paging receiver can have various modes for operation.

23
24 **Figure 5a** shows a sample data record that can be prestored and contained
25 within a personal communication device.

26
27 **Figure 5b** shows a sample display of message notifications received at a
28 personal communication device.

1 **Figure 5c** shows a memory address register within a personal communicator
2 device which stores caller id and voice message data received.

3
4 **Figures 6a** and **6b** are block diagrams of received fax header information
5 transmitted as caller identifying information.

6
7 **Figures 7a** and **7b** show improved ACK-BACK stored voice devices.

8
9 **Figures 8a** shows a data connection between a personal computer and paging
10 receiver suitable for transfer of sound files to or from a portable communication device.
11 **Figure 8b** shows one preferred embodiment of a stored sound file that can be
12 transferred to a portable communication device.

13
14 **Figures 9a** and **9b** depict improved ACK-BACK systems adapted to the
15 inventions herein.

16
17 **Figure 10** is a block diagram of a system utilizing a dialing pager receiver
18 adapted to the inventions.

19
20 **Figure 11** depicts a prior art telephone communication network.

21
22 **Figures 12a, 12b** and **12c** depict schematically caller-identification information
23 which is transmitted over a telephone network.

24
25 **Figure 13** depicts a numeric paging network in accordance with the one
26 embodiment of the invention, which is coupled to a conventional telephone network.

27
28 **Figure 14** depicts an alphanumeric paging network in accordance with the one
29 embodiment of the invention, which is coupled with a conventional telephone network.

1
2 **Figure 15** depicts a portion of a database which attributes textual messages to
3 particular numeric or alphanumeric codes.
4

5 **Figure 16** depicts a memory buffer which stores paging requests received or
6 transmitted to a portable communication device.
7

8 **Figures 17, 18, 19a, 19b and 19c** depict alternative portable communication
9 devices in accordance with the one embodiment of the invention.
10

11 **Figure 20** depicts in block diagram form the operational blocks of a portable
12 communication device in accordance with one embodiment of the invention.
13

14 **Figure 21** depicts in flowchart form the process of engaging a paging network via
15 telephone network.
16

17 **Figure 22** depicts a database with a plurality of data fields which identify
18 information which pertains to potential communicants, and which is maintained in
19 memory within the portable communication device.
20

21 **Figures 23, 24, 25 and 26** depict alternative configurations of the portable
22 communication device in accordance with alternative embodiments of the invention.
23

24 **Figure 27** is a block diagram representation of the hardware and software
25 components which are utilized to exchange data between a computing device and the
26 portable communication device in accordance with one embodiment of the invention.
27

28 **Figure 28** depicts yet another configuration of the components which cooperate
29 to transmit data between a computing device and the portable communication device.

1
2
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4
5

Figur s 29, 30, 31, 32 and 33 depict in block diagram, schematic, and flowchart form a technique for developing a database with information pertaining to potential communicants for utilization in the portable communication.

DETAILED DESCRIPTION OF THE INVENTIONS

Set forth below is a description of what is currently believed to be the preferred embodiment or best example of the invention claimed. Future and present alternatives and modifications which make insubstantial changes in function, in purpose, in structure or in result are intended to be covered by the claims of this patent. Where alternative meanings are possible, the broadest meaning is intended. All words used in the claims are intended to be used in the normal, customary usage of grammar and the English language.

The automatic transmission of caller id or ANI data from the PSTN to a message center, for storage and retransmission along with optional other data to a paging center to be received in a personal communicator is addressed. Other advantages and objects will be realized by the description which follows.

Figure 1a shows a prior art stored voice paging receiver without a display means that enables a called party to fast forward and reverse through voice messages received. Though useful, this type of device requires the called party to listen to part of each message received before determining which message to listen to. The inventions described herein teaches how an improved stored voice paging receiver can include a display that shows the identity of the callers before the voice message is selected and heard by the called party.

In Figure 1b is shown one embodiment which may receive textual caller identifying data and display the data on a display means. Additionally, received textual caller identifying data can be applied to a text to speech synthesis section for annunciation prior to the replay of a voice message. Alternatively, caller identifying information may be received in an audible voice form and played prior to the replay of a voice message.

1
2 Figure 1c shows an alternative embodiment of a stored voice paging receiver
3 with prestored voice or sound signals and a coincidence detector, along with a DTMF
4 tone decoder.

5
6 Figure 1d shows an alternative embodiment of a non-display autodialing type
7 paging receiver with text-to-speech synthesis.

8
9 A detailed description of the device operation in Figures 1b - 1d will follow later in
10 this specification.

11
12 Figure 2a shows a paging system to be described hereinafter in which caller id
13 data is received and stored at a called station location with a message center device
14 and retransmitted to a paging center over the public switched telephone network
15 (PSTN).

16
17 Figure 2b shows an alternative embodiment in which a personal message center
18 is located at the telephone office (102) rather than at the called party office (300), such
19 as voice mail service offered by the Regional Bell Operating Companies such as Pacific
20 Bell Telephone. For brevity, the discussions herein are directed to Figure 2a although
21 it is recognized that the embodiments described herein could be applied to a system
22 such as described in Figure 2b, or other similar systems.

23
24 In Figure 2a, a calling party places TEL 1 in an off-hook condition and initiates a
25 communication over the PSTN via telephone line (501) to an originating central
26 office(101) through telephone line (502) to terminating central office (102). The caller id
27 data is supplied in the conventional manner between the ringing signals from the
28 terminating central office (102) through telephone line (503) to a called station location
29 (300) which has a message center (301) and extension telephone TEL 3.

1
2 Alternately, caller id data in an ISDN environment can be sent as described in
3 Bellcore document SR-NWT-002006 entitled National ISDN, U.S. Patent 4,899,358 and
4 4,922,490 patents issued Blakely, and other Bellcore technical references widely
5 available and not described but incorporated herein by reference. Typically caller
6 identifying data supplied from custom calling services in an ISDN environment can be
7 received and stored at a message center similar to a POTS (plain old telephone service)
8 environment and later transmitted to a paging receiver held by a remotely located called
9 party.

10
11 Message center device (301) may be a conventional telephone answering
12 device, a personal computer with voice/fax mail or modem communications, or a
13 conventional facsimile device, or some other device suitable for receiving incoming calls
14 automatically and initiating automatic outgoing calls automatically to a paging center in
15 response to calls received.

16
17 US Patents 4,737,979, 4,821,308, 5,333,179, 5,159,624, 5,208,850, 5,077,786,
18 5,014,296 and 4,985,913 and 5,128,980 are all variants of such devices and are
19 incorporated herein by reference, though not fundamental to the claimed inventions. For
20 example, 4,821,308 issued to Hashimoto requires manual DTMF entry by a calling party
21 of the calling parties number. In 4,985,913 caller identifying information can be
22 automatically received and stored to generate a particular paging notification but the
23 actual caller identifying data received and stored is not transmitted to a called
24 communicant through a paging center.

25
26 Fundamental circuitry for telephony and telephone related devices can be found
27 in Understanding Telephone Electronics, Third Edition, by Bigelow, also incorporated
28 herein by reference. Also incorporated herein by reference is a textbook entitled Voice
29 Processing written by Gordon E. Pelton which is a useful reference for fundamental

1 concepts discussed in this specification.

2
3 Additionally, other devices that may be incorporated in the message center
4 include a telephone answering device with video telephone as described in US
5 5,046,079, also incorporated herein by reference. Such a device is capable of receiving
6 a picture signal sent between the ringing signals that is intended to establish the identity
7 of the calling party similar to conventional textual or audible caller id information. The
8 caller identifying video image may be stored on a recording medium. Telephone devices
9 at the calling party side (TEL 1) that could be used include the AT&T VideoPhone 2500
10 or other popular teleconferencing products available recently on the personal computer.
11 For example, US Patent 5,278,889 incorporated herein by reference describes one such
12 implementation of a video telephony system. For purposes of brevity it is understood
13 that methods other than those discussed at length for textual data detection and
14 reception would be more appropriate for transmitting caller identifying video images, as
15 is well known in the art.

16
17 Message Center device (301) may automatically initiate an off-hook condition in
18 response to a ringing signal by using a ring detect interface circuit or some other means,
19 as is well known in the art. The Message Center device (301) also has a caller id
20 detection circuit which is suitable for detecting caller id data transmitted in between the
21 first and second ringing signals. The caller id detection circuit for textual data includes a
22 filter and demodulator circuit that is used for demodulating a 300 baud rate of incoming
23 serial data stream using the technique of Frequency Shift keying. Data received by the
24 circuit may include data representing the incoming telephone number, name, date and
25 time of the current incoming call.

26
27 In a Personal Computer device equipped with a modem that can receive
28 incoming calls, caller id can also be received. Such a device is becoming more popular
29 with users in that a variety of modems that can receive facsimile and/or facsimile

1 combined with voice messages are currently available. In US 5,343,516 issued to
2 Callele et al. is shown a computer system which can receive caller identification
3 information supplied between the ringing signals in the conventional manner, which is
4 incorporated herein by reference. Their invention is interesting in that it provides for the
5 delivery of caller id information to a computer device connected to the PSTN which can
6 transfer caller id data over a network to other computers and telephone sets that are the
7 destination of the incoming telephone call. This patent does not teach how to
8 communicate this information to a remote wireless personal communicator however.

9
10 In one embodiment as described in this specification, the modem monitors the
11 phone line between the first and second ring burst without causing the data access
12 arrangement to go off hook in the conventional sense, which would inhibit transmission
13 of Calling Number Identification. A V.23 1200 bbs modem receiver may be used to
14 demodulate the Bell 202 signal. The ring indicate bit (RI) may be used on a modem to
15 indicate when to monitor the phone line for CND information. After the RI bit sets,
16 indicating the first ring burst, the host waits for the RI bit to reset. The host then
17 configures the modem to monitor the phone line for Calling Number Identification. The
18 CND signalling starts as early as 300 ms after the first ring burst and ends at least 475
19 mS before the second ring burst.

20
21 The received calling Number Identification may then be stored in a memory in the
22 Personal Computer as herein described. Calling name and other information could also
23 be received, stored and transmitted using ascii character representations of the data in a
24 similar fashion. In an alternative embodiment, the received number information could be
25 used with a table look-up to append the prestored calling parties name in the personal
26 computer with the received numeric caller id data for retransmission to an alphanumeric
27 paging center. Blocked information represented by the ASCII character "P" could also
28 be received , stored and retransmitted to a paging center, or used to inhibit a paging
29 transmission to a personal communicator device. Alternate numbers could be specified

1 by the calling party to be used as the Incoming Line Identification number, as is seen in
2 US 5,283,824 issued to Shaw and incorporated herein by reference. The calling party
3 may be provided with the option of having the number of his calling station or some
4 other number used as the Incoming Caller Identification number such as his/her home
5 or business telephone number. This option could be provided to the calling party by the
6 telephone switch in the case of a credit card or other type call, or could be provided to
7 the calling party by the message center by means of audible voice instructions. In either
8 case alternate data could be stored for later transmission from the message center to a
9 paging transmitter.

10
11 The caller identifying data could also be used as described in US 4,985,913, US
12 5,278,894 and others incorporated herein by reference, in which customized greeting
13 messages could be used when particular caller id data is received at the message
14 center.

15
16 Alternatively, the message center device (301) may include an ANI detection
17 circuit rather than the caller id detection circuit previously described. ANI encoding is a
18 function performed by the network which identifies the originating phone number of the
19 message delivered to the received telephone line. ANI encoding is currently used in
20 "911" information systems, 800 and 900 numbers and many private PBX exchange
21 systems. For example, in US 4,313,035 issued to Jordan et al. incorporated herein by
22 reference is described a paging service in which the ANI directory telephone number of
23 the calling party may be delivered and stored at a TSPS (Traffic Service Position
24 System) and stored in a data base. Using a paging facility such as the BELLBOY
25 personal signalling system, a paging signal can be generated to a remote called party.
26 The called party, in response to an alert in a paging receiver, can then initiate an inquiry
27 call to determine the identity of the caller and return the call. In the improvements
28 described herein, the identity of the calling party is delivered automatically to the called
29 party paging receiver.

1
2 ANI may also be delivered to the message center device and then retransmitted
3 to a paging center with multi-frequency or DTMF tones using a somewhat different data
4 transmission protocol from caller id, which will now be described.
5

6 The information delivered from ANI ranges from Level A service that provides
7 caller area code only to Level D service that provides caller area code, city, local
8 exchange # and phone #. Further details about ANI are shown in US Patent 4,942,598
9 issued to Davis and Bellcore Technical Reference TR-NWT-000064 and FSD
10 20-20-0000 entitled LATA Switching Systems Generic Requirements - Automatic
11 Number Identification and Operator Number Identification, which are both incorporated
12 herein by reference. Such an alternative arrangement may prove to be useful to
13 customers utilizing inbound 800 numbers as the primary access for calling parties to a
14 message center.
15

16 **ANI DETECTOR USED IN A PAGING CENTER**

17 In a related disclosure, ANI information instead of caller id information can be
18 used for transmission to a called party personal communicator. By incorporating an ANI
19 decoder directly within a paging center, calling party ANI information can be
20 incorporated in a system similar to that shown in copending applications 08/177,550 and
21 08/177,551.
22

23 Hereinafter, the generic term caller id shall be used interchangeably to describe
24 conventional number and number/name caller id, ANI, video, fax header or alternate
25 manually entered caller identifying data.
26

27 It should be understood that when a particular implementation is referring to ANI,
28 the necessary decoding circuitry and transmission protocol would be used as opposed
29 to different decoding circuitry and transmission protocol used for Caller ID or other caller

1 identifying data.
2
3

4 **CALLER ID USED IN A PAGING SYSTEM WITH A SEPARATE MESSAGE CENTER**

5 The message center device includes a memory to store and retrieve caller
6 identifying data received in a memory means, as is well known in the art. One such
7 apparatus is described in US 5,238,818 and US 5,390,346 issued to Klausner et al and
8 incorporated herein by reference. The message center device (301) also has prestored
9 paging transmission data in a memory means which may include at least the telephone
10 number of the paging center and any pager id data that will ensure data transmitted will
11 be sent to the appropriate called party. The pager id data typically ranges from 4 to 15
12 digits in length to uniquely identify a paging receiver. Such prestored data may be
13 automatically recalled at the message center to generate dialing instructions to a paging
14 center upon receipt and storage of an incoming call and optional data message.
15

16 Upon receiving caller id data supplied from the terminating central office at the
17 called station location, the caller id data is stored in a memory or on a hard disk drive
18 and the message center device then initiates an off-hook condition to answer the call.
19 Then if the message center device (301) is of the type that stores voice messages, an
20 outgoing message such as conventionally generated by a telephone answering machine
21 or PC voice mail system or video telephone answering machine may be transmitted to
22 the calling party and a calling party may respond by annunciating a voice or video
23 message. The voice or video message is received and stored at the message center
24 (301). In addition, the stored voice or video data may be encoded or compressed to
25 conserve memory storage space in the message center device. Compression of the
26 message data will also reduce transmission time required later when the message data
27 is sent in a subsequent paging transmission from the message center device (301) to a
28 paging center (105). One such compression algorithm which is known as G.723 is
29 slated for approval by the International Telecommunications Union (ITU). It is intended

1 for use with real-time multimedia, simultaneous voice and data, and conferencing
2 applications. A software solution that delivers such a compression algorithm is available
3 from a company known as DSP Group, Inc. out of Santa Clara, California, known as
4 TrueSpeech. This software currently will run on processors such as the Texas
5 Instruments TMS320C5X, Motorola 56156 Digital Signal Processor, Intel
6 386/486/Pentium, Analog Devices 2100 and other processors.

7
8 The voice or other data may be stored contiguously in a memory location with
9 caller id data received or stored in a different memory location and associated with caller
10 id data received and stored, for later transmission to a called party personal
11 communicator(201). After the data is stored on a recording means at the message
12 center device (301) the calling party at TEL 1 hangs up.

13
14 Other message data received by the message center and associated with caller
15 id data could be received and stored in a similar fashion. For example, the message
16 center may receive a facsimile image, or a video telephone message. Received
17 facsimile or video image data could be stored with caller ID or caller identifying data and
18 transmitted to a paging receiver adapted to store and view facsimiles or video images
19 along with associated caller id or caller identifying data. Such data could be encrypted
20 such as is described in US 5,285,496 issued to Frank et al. and incorporated herein by
21 reference or compressed as previously described to reduce the message size for
22 storage and transmission.

23
24 Other textual special message data such as described in US 4,811,382 could be
25 captured at the message center to be transmitted to a paging center, which is herein
26 incorporated by reference. This textual data could be sent to the message center in
27 place of caller identifying data or along with caller identifying data that could be used as
28 a header record for notification within a personal communicator device.

1 Upon detecting that the called party has disconnected, the message center
2 device (301) hangs up. Then the message center device (301) is returned to an off hook
3 condition and automatic paging instructions are retrieved from the prestored memory
4 means in the message center device. In the case where a paging transmitter is integral
5 to the message center, no outward dialing to the PSTN is required but instead, a paging
6 transmission may occur directly. In the case where a second telephone line is connected
7 to the message center, the message data received on the first telephone line from the
8 calling party could be sent out to a paging center over the second telephone line prior to
9 disconnection with the calling party on the first telephone line.

10
11 Follows is described a system where a paging center is connected to the
12 message center by a connection with the PSTN. Dialing instructions prestored typically
13 would include the modem access # for the paging center, and a pin # associated with a
14 particular personal communicator device or pager which is usually either 4, 7, or 15
15 digits in length, but could be any unique identifying data. A calling signal is sent to a
16 paging center (105) through telephone line (503) to originating central telephone office
17 (102) and telephone line (504), to terminating central telephone office (103).

18
19 Terminating central telephone office (103) is connected to paging center (105) by
20 a modem adapted to establish communication using predetermined communications
21 protocol suitable for the type of paging service provided. For example, data
22 communication protocol may be significantly different for numeric data from that
23 required for stored voice data communications.

24
25 The paging center (105) answers in response to a calling signal from a message
26 center and the data representative of caller id data is sent to the paging center from the
27 memory of the message center. The caller identifying data is sent to the paging center
28 using the predetermined signalling protocol (to be discussed hereinafter) followed or
29 preceded by any optional data to be transmitted. Alternatively, the message center could

1 employ a tone or other decoder responsive to control signals generated by the paging
2 center. Such a tone or other tone decoder could be employed prior to initiating the
3 transmission of caller id and message data using a predetermined signalling protocol,
4 rather than automatically transmitting the data by default or after a predetermined time
5 period elapsed. As one example of various signalling protocols that could be used, US
6 Patent 4,878,051 and 4,868,860 issued to Andros et al. are incorporated herein by
7 reference.

8
9 Copending applications 08/177,550 and 08/177,851 both deal with paging
10 centers of the type that incorporate a caller id detection circuit connected to the paging
11 center that allow automatic detection and transmission of caller identification data to a
12 numeric, alphanumeric, or stored voice paging receiver or personal communication
13 device.

14
15 If the paging center is the type which allows caller id data to be detected from an
16 incoming caller and transmitted to a paging receiver automatically as described in the
17 above patent applications, the transmission of caller id data may be prevented by a
18 special signal present in the data transmission from the message center or by some
19 other means. For example by preceding the string of data sent from the message center
20 with a # sign, the paging center will detect the "#" sign and disable storage and
21 transmission of any caller identification data received at the caller id detector of the
22 paging center for that particular incoming call from the message center (301). Such
23 caller id data of the message center location would not be transmitted to the called party
24 portable communication device(201) in this case. Instead, the caller id data of the
25 original calling party would be sent to the pager. In another example, a caller id blocking
26 signal could be appended to the outward dialing signal that would instruct the
27 terminating central office to block transmission of caller id data from the message
28 center. Alternatively, the absence of a special signal in the string of data sent from the
29 message center (301) could indicate that the caller id data detected by the caller id

1 detector in the paging center and the string of prestored caller identifying data from the
2 message center would both be sent to called party personal communicator (201).
3 Alternatively, only the caller identification data corresponding to the message center
4 could be sent and the caller id data corresponding to the original calling party could be
5 prevented from transmission to a called party personal communicator. Such
6 modifications in the preferred embodiments invention herein provide flexibility for the
7 called parties to receive very diverse information at their paging receiver. Additionally
8 receipt of, in the above case, a "#" sign could allow for the storage of the caller id data
9 corresponding to the incoming call from the message center, but prevent the data from
10 being transmitted along with data received from the message center. Such a feature
11 would be useful to the operators at the paging center who might wish to know from
12 where their call volume originated.

13
14 In yet an alternative embodiment, the paging subscriber could predetermine in
15 advance at the paging center which calling parties they wished to receive pages from.
16 Any other calling parties not having a corresponding caller id signal that matched the
17 prestored preferences at the paging center would not be able to cause a paging signal to
18 be transmitted.

19
20 If paging center (105) is not of the type that is caller id enabled, then no such
21 special code is necessary to inhibit unwanted caller id data of the message center (301)
22 from transmission. In this case the caller id and other data received and stored at the
23 message center (301) may be automatically, or in response to a control signal
24 originating from the paging center (105), be transmitted to the paging center from the
25 message center. The message center could also automatically insert other caller
26 identifying or other data corresponding to items such as the number of facsimile pages
27 or actual voice or fax message received, or some other useful information to be sent to
28 a paging center along with the caller id data and optional message data.

1 In one preferred embodiment within the message center (301), the caller ID data
2 is recalled from the memory means of the message center and converted to DTMF
3 signals. One device particularly useful for conversion of caller id data to DTMF signals is
4 manufactured by Nicollet Technologies, Inc. known as the DTS-2040.

5
6 Such DTMF signals representative of numeric caller id data are then transmitted
7 from the message center to the paging center after the paging center has answered the
8 call initiated by the message center and signalled that it is ready to receive data. This
9 feature is especially useful in a numeric paging environment.

10
11 Conversion at the message center of the stored caller id data to be retransmitted
12 over the PSTN to a paging center is not limited to DTMF signals, but may also include
13 other signalling means appropriate for alphanumeric data typically received from caller
14 id services such as name and date information. In another device manufactured by
15 Nicollet Industries, Inc., the DTS-1082 can capture caller id data and convert it to ascii
16 data for storage and later retransmission from the message center to a paging center.

17
18 In addition, fax header or E-mail information received at the message center
19 could be used alternatively as caller identifying information. Figures 6a and 6b
20 summarize one embodiment of this concept. The message center could, for example,
21 upon detection of a CNG tone, store conventional fax header information received for
22 retransmission to a paging center or for transmission to a personal communicator
23 directly from a paging transmitter integral or directly connected to the message center.
24 The fax header or Email information could be transmitted to a personal communicator
25 device that has prestored caller data contained in a memory along with a comparing
26 means. The caller data could include a variety of information corresponding to frequent
27 callers, including name, address, telephone number, fax number, and E mail addresses
28 for each calling party. Additionally, a prestored voice annunciation corresponding to the
29 identity of a caller or a prestored video image representative of the calling party could

1 also be included in each caller record. Upon detection of a coincidence between the fax
2 or E mail or other data received, the other associated data from the corresponding data
3 record could be made available to the called party.
4

5 **CALLER IDENTIFYING DATA COMPRISED OF FAX HEADER DATA TRANSMITTED** 6 **TO A PAGING CENTER AND PERSONAL COMMUNICATOR DEVICE**

7 Fax header information and the protocol for communication between facsimile
8 message communications devices is notoriously old. For reference, see the book
9 entitled FAX: Digital Facsimile Technology and Applications, Second Edition, and
10 Standards developed by the CCITT (International Telegraph and Telephone
11 Consultative Committee) including T.30 incorporated herein by reference. Other
12 standards are widely known though not discussed in detail here.
13

14 Briefly, in a message center which is receiving a Group 3 fax from a calling party,
15 the calling parties device can send a coded signal known as the transmit subscriber
16 identification (TSI) after handshaking is established during what is referred to as the call
17 set up or phase A. Typically the calling fax dials the telephone number of the message
18 center over the PSTN. The ring signal and the CNG calling tone are received at the
19 called message center and the CNG tone indicates the call is from a fax machine
20 instead of a voice call. The called message center answers the call by going off hook.
21 Then typically after a one second delay, the called message center sends its called
22 station identification (CSI), a 3 second 2100 Hz tone, back to the calling fax machine.
23

24 Then during Phase B known as the premessage procedure, the called fax
25 machine sends the TSI which includes at least the telephone number of the calling party
26 fax machine. This information is typically used in the message center as fax header
27 information. But in the inventions herein, it could be used alternatively as caller
28 identifying data that can be stored in a memory at the message center for transmission
29 to a paging center to a personal communicator device similar to the methods described

1 for other caller id data. Such TSI data could be used alternatively for those areas or
2 users that do not have caller id service. In addition, such message data in the TSI may
3 include alphanumeric characters representing the calling party, time and date
4 information and page number data. In a system using only number only caller id, for
5 example, the alphanumeric data corresponding to the name of the sending party
6 contained in the TSI could be appended to the numeric caller id data for transmission to
7 a paging center and personal communicator device. Such a method could be activated
8 by the detection of a CNG signal at the message center. Alternatively, a means of
9 counting the pages received could be employed at the message center, and the total
10 number of pages received could be appended to the caller identifying data. In another
11 embodiment, only faxes of a certain length would be sent to a personal communicator
12 device.

13
14 Predefined user preferences could be used within the message center along with
15 a comparing means using the caller identifying TSI information to determine whether the
16 image data received would be sent to a personal communicator device or just the
17 notification data comprised of the caller identifying data.

18
19 In any case, alphanumeric caller identifying data could be transmitted to a paging
20 center or through an integral paging transmitter connected to the message center using
21 the same alphanumeric protocol currently used in conventional alphanumeric paging
22 systems known as TAP or IXO, incorporated herein by reference. These protocols could
23 be suitable signalling means for transmission of alphanumeric caller id data from the
24 personal message center device to a paging service modem. Typically this conventional
25 alphanumeric protocol operates at 300 baud and is well known in the art.

26
27 Of course in this case the paging center would require a suitable decoder that
28 could receive and decode the alphanumeric data from the message center. This feature
29 is especially desirable in an alphanumeric paging service in that some textual

1 alphanumeric information may be transmitted automatically for the calling party using a
2 conventional telephone at the TEL 1 which is typically devoid of any alphanumeric input
3 means. This is a significant improvement over the prior art. Various other signalling
4 protocols could be used between the message center device and the modem at the
5 paging center without departing from the spirit of the inventions herein that may be more
6 adapted to higher data transmission speeds, compression algorithms or the like. For
7 example, the PCIA has made available other protocols for alternative data transmission
8 such as image and other data referred to as TDP Protocol, issued June 12, 1993, which
9 is incorporated herein by reference. These protocols could be modified to incorporate
10 caller identifying data fields for transmission with other optional data. Some paging
11 centers do not adhere strictly to published protocol but instead have a variant of their
12 own. In this case, it could be possible for the message center to establish the protocol
13 used by the paging center dynamically by first recognizing and then selecting from
14 among several different known protocols for subsequent transmission of the
15 alphanumeric caller identifying data in a form recognized by the paging center.
16 Incorporated herein by reference is a good reference entitled Understanding Data
17 Communications, Third Edition by Held which gives a fundamental overview of various
18 communications methods and terminology.

19 20 **TEXT TO SPEECH CONVERSION CONDUCTED AT THE TERMINATING CENTRAL** 21 **OFFICE**

22
23 Alternatively, the terminating central office (102) could apply a text to speech
24 converter, similar to that shown in US 4,899,358 issued to Blakely, in which an
25 annunciated caller identifying signal is sent from the terminating switch to the message
26 center device at the called station location. It is incorporated herein by reference. Such
27 annunciated caller identifying information could be particularly useful when used in a
28 stored voice paging receiver similar to devices shown in US 4,965,569 Bennett et al.,
29 US 4,868,560 issued to Oliwa, 4,873,520 issued to Fisch et al., and US 5,153,579 Fisch

1 et al., also incorporated herein by reference.

2
3 In one embodiment the caller id data is supplied to the message center from the
4 terminating central office as an audible voice representation of caller id data and stored
5 at the message center. Such data may also be encoded as previously described to
6 conserve memory storage.

7
8 In this embodiment the audible encoded caller id data can be transferred to a
9 paging center as previously described along with any optional data for transmission from
10 a paging center and annunciation at a personal communication device.

11 12 **TEXT TO SPEECH CONVERSION WITHIN THE MESSAGE CENTER OR PAGING** 13 **CENTER**

14 Alternatively, received and stored textual caller id data could be applied to a
15 speech synthesizer unit contained within the message center or paging center, as partly
16 described in US Patent 4,720,848 issued to Akiyama, 5,349,638 issued to Pitroda et al.
17 or US 4,742,516 issued to Yamaguchi, which deals with a communication system with a
18 voice announcement means. They are herein incorporated by reference. Also
19 incorporated herein by reference is a software product offered by Stylus Innovation, Inc.
20 out of Cambridge Mass. known as Visual Voice which runs on a personal computer.
21 Using a digital signal processor in the personal computer, text to speech processing can
22 be applied to caller id data. The resulting speech signals representative of the caller id
23 data can be stored in a storage medium within the message center for transmission to a
24 stored voice paging center.

25
26 In addition, the Visual Voice system has an international language support that
27 can speak the caller id data in the language desired by the called party at a personal
28 communication device or at the message center. In any case, received textual caller
29 identifying data which is stored at the message center is transferred to a paging center

1 and transmitted as audible speech signals to a stored voice paging receiver.
2 Alternatively, the textual data may be applied to a text to speech converter within a
3 personal communication device for annunciation, as is well known in the art.
4

5 Irrespective of the signalling used after the calling party has disconnected with
6 the message center, DTMF or other signals representing the stored caller id data are
7 sent from the message center through the PSTN to the paging center. Any optional data
8 such as additional voice message data, DTMF, image or other message data entered by
9 the calling party may also be transferred from the message center (301) memory means
10 to the paging center for transmission to the called party personal communicator (210)
11 via radio link (509). Such a feature is useful in paging systems which include stored
12 voice paging receivers and non-voice paging systems such as described in 5,095,307 or
13 4,961,216, which are also incorporated herein by reference. In the case where caller id
14 service is not available to a calling or called party, particularly in the case of stored voice
15 paging systems, a DTMF entry could be made by the calling party to represent the caller
16 identifying data to be transmitted with optional data such as a voice message. If the
17 caller id detector failed to detect any caller id, a default voice message prompt could be
18 generated by the message center that instructed the caller to enter at least their
19 telephone number in the conventional manner using an input device at the calling
20 parties telephone. Then the caller could be instructed to leave an optional voice
21 message which could then be transmitted to a paging center after the caller hangs up.
22 Such data would be stored at the message center as previously described and then the
23 message center could automatically call the paging center. Alternatively, caller
24 identifying data could be detected, an acknowledgement of the received and stored
25 caller id data could be annunciated back to the caller, and an option could be given to
26 modify or change the caller id data prior to leaving a voice or other optional data
27 message.
28

29 Other caller identifying data which may be more readily recognized by the called

1 party could be entered in place of the caller id data for example.
2

3 The information could then be transmitted by the paging center and received at a
4 stored voice paging receiver for display, annunciation and used as redial data within the
5 personal communicator device. This feature is especially useful in those cases where no
6 caller identifying data would otherwise be associated with a voice message for
7 transmission to a stored voice paging receiver or personal communicator device and is a
8 significant improvement over the prior art stored voice paging receivers.
9

10 A special code such as "*" or some other special code could be used to signal
11 the end of any DTMF or other signal data representative of caller id and to signify the
12 beginning of transmission of optional data stored at the message center. This code
13 could be automatically included by the personal message center or manually entered by
14 the calling party for storage and transmission with the caller identifying data string stored
15 at the personal message center. Optional data, such as a voice message or other data
16 entered or sent by a calling party could then be stored and transmitted after the caller
17 identifying data and demarcation code. Other coding methodologies which demarc the
18 stored caller id data from other stored optional message data may be used and are not
19 fundamental to the claimed inventions herein but are considered obvious to those skilled
20 in the art.
21

22 In the example above, wherein said optional data is a voice message, the receipt
23 of a special code signal at the paging center (105) from the message center (301) could
24 enable a voice storage memory and receiving means at the paging center to distinguish
25 other data representative of caller id information from optional data such as voice
26 messages. In addition, the data types of the caller identifying data and optional message
27 data could be different from each other and not require any demarcation data. In one
28 such case, caller identifying textual data could be detected by one type of detector at the
29 paging transmitter, and voice or image data could be detected by another type of

1 detector at the paging transmitter. The paging center could then store the data received
2 and retransmit the data to a personal communicator device.

3
4 The paging center may receive the optional data such as a voice or textual
5 message from the message center to be stored in a memory means at the paging
6 center. When the transmission is completed from the messaging center, the
7 communication with the paging center is ended and the message center and the paging
8 center hang up.

9
10 The paging center then initiates a paging transmission to the appropriate paging
11 receiver and retrieves any stored caller id data and optional data from the memory
12 means transferred from the message center. After the pager id is decoded in the
13 conventional fashion at the personal communicator device, the telephone number and
14 /or number and name (if present) and optional date and time information representative
15 of the caller id of the calling party, along with any optional data message such as a
16 voice, text or image message, are received by the called party personal communicator.

17
18 Such received data could be stored in different memory locations or in one
19 contiguous memory within the personal communicator device, demarcated by the special
20 coding method employed, to be accessed within a stored voice or other paging receiver
21 held by the called party in a variety of ways known to those skilled in the art.

22
23 In one example, to access the caller id data, a called party might press a "view"
24 button to see the caller identifying data. Or by default, the caller id data might be
25 displayed automatically when received or after a PIN is entered by the called party. To
26 access the actual voice message, a called party might press a "play" button. Such a
27 personal communicator could also be responsive to voice commands annunciated by
28 the called party into a microphone and a voice command unit within the personal
29 communicator device which is connected to the microphone and is responsive to

1 commands such as "PLAY", "REWIND", FORWARD", etc.. In addition, stored voice
2 messages could be recorded on a removable memory such as a PCMCIA memory card
3 that is now very popular in portable computing devices. Stored voice messages with or
4 without corresponding caller identifying data could be transferred from the personal
5 communicator device to another computing or voice message storage device in a
6 central location such as the office of the called party.

7 8 **PERSONAL COMMUNICATOR DEVICE WITH IMPROVED TIME DATA INPUT** 9 **MEANS USING CALLER ID DATA**

10 In the caller id data received and stored at the paging center or message center,
11 time data corresponding to the time and date a communication was received could be
12 transmitted to a personal communicator device. This could be particularly useful in a
13 system in which several messages received were held in a queue for some time before
14 a transmission occurred to the personal communicator device. The time data could be
15 used as a sorting record at the paging center or message center to determine which
16 calls were transmitted in a batch fashion as opposed to immediately transmitted upon
17 receipt at the paging or message center.

18
19 For example, all calls received during peak periods during a certain time of day
20 may be transmitted later off-peak to reduce congestion on the wireless communication
21 system. Or all calls received during weekends or holidays could be transmitted in a
22 lower priority queuing sequence than calls received during the week. In addition,
23 message data received at the personal communicator could be organized and accessed
24 according to the date and time the communication was completed in a very accurate
25 and automatic fashion for the calling and called party. See related US Patent 4,872,005
26 issued to DeLuca et al. incorporated herein by reference.

27
28 In addition, such caller id time and date data could be used to initialize a time of
29 day clock contained within a personal communicator device such as a Personal

1 computer, cellular phone or the like. This could be beneficial in the circumstance where
2 a power failure erased the time and date information ordinarily entered manually by a
3 user. Other devices such as VCRs, automobile clocks and the like could be equipped
4 with a receiver that could accept such information as well.

5 6 **CALLER ID FROM A PBX WITH AN INTEGRATED OR CONNECTED TRANSMITTER** 7 **TO A PERSONAL COMMUNICATOR**

8
9 The message center could be directly connected to a paging transmitter that
10 would not require a dial in via the PSTN to a paging network. In one embodiment, the
11 message center and the paging transmitter could be an apparatus similar to that
12 described in US 5,151,930 issued to Hagl which describes a paging system within a
13 telephone private branch exchange and incorporated herein by reference. Such a
14 system could be modified such that any calls coming in from outside the PBX could be
15 passed through a caller id detector circuit as previously described, and this information
16 could be sent through to a personal communicator or call device.

17
18 In an alternate embodiment, caller id data could be delivered to a local paging
19 system such as a unit offered by Motorola known as "Site-call" which is typically
20 connected to a PBX such as the Meridian 1 manufactured by Northern Telecom.

21
22 Appropriate software and hardware at the PBX could capture and deliver ANI or
23 Caller ID data to the "Site-Call" or similar local paging system. The prior art local paging
24 systems require a calling party to enter their telephone number by DTMF entry, which is
25 then transmitted by a local paging transmitter. This is limited in that only numeric data
26 may be received and displayed to alert a called party. Alternatively in the prior art
27 systems, a message such as "outside call" is displayed at the pager. By integrating
28 various concepts taught in the embodiments herein, telephone number data and other
29 caller identifying data may be automatically sent from a PBX to an onsite pager for

1 display, annunciation, or other alerting means.

2
3 Alternately, a call could be received at the PBX and if the call was unanswered at
4 the called station, a message could be taken in a voice mail center and the caller id
5 data(along with an optional voice or other message) could be delivered to a paging
6 receiver by way of an onsite or offsite paging transmitter.

7
8 The message center device may be directly connected to a paging terminal,
9 thereby eliminating the necessity of a second connection to the telephone network. The
10 paging terminal could be a "People Finder" paging terminal manufactured by Motorola,
11 Inc.

12
13 In another implementation, the message center device is interfaced to a paging
14 terminal such as the Modax paging terminal manufactured by Motorola, Inc. which was
15 adapted to transmit additional caller identification information with a standard paging
16 transmission. The interface from the message center to the paging terminal may be
17 through a 1 or 2 telephone line interface. The interconnection to a paging terminal and
18 the terminal's subsequent operation are well known in the art. The paging terminal
19 transmits to a personal communicator which is capable of receiving and decoding
20 paging signals modulated by the paging terminal in a radio frequency manner. The
21 personal communicator also has the capability to store a message and to play back a
22 message which may include caller identifying source indicator data as previously
23 described that may be viewed on a display member or heard first through an
24 annunciation means.

25
26 In FIGURE 2b is described a message center which is at the telephone office
27 rather than the called party office. The concepts previously described for a called party
28 office based message center could also be modified and incorporated in the
29 conventional voice mail system offered by the telephone company.

1

2 **AUTOMATIC PAGING TELEPHONE SET USING CALLER ID INSTEAD OF DTMF**
3 **FOR CALLER IDENTIFYING DATA**

4 In US 5,128,980 issued to Choi is described a system in which a calling party
5 may enter their phone number using DTMF for automatic transmission to a paging
6 center and is incorporated herein by reference. This method could be modified to
7 incorporate a caller id detector which would be substituted for, or supplied in addition to,
8 the DTMF receiver. When the device is in a pager number recording mode (either
9 between the first and second ringing signals or after the device is placed in an off-hook
10 position) the caller id data may be entered and stored automatically for the calling party,
11 may be manually entered by DTMF entry by the calling party, or may be entered and
12 stored using part of the caller id data supplied automatically and part of the data
13 manually entered by the calling party. Then the caller identifying data can be transmitted
14 to a paging center along with any optional data as described in the patent in an
15 automatic, manual, or combined fashion.

16

17 **COINCIDENCE DETECTION WITHIN THE MESSAGE CENTER**

18 Optional data such as a voice message can be selectively transmitted to the
19 called party, based on some comparator at the message center that analyzes the
20 source identity of the calling party with prestored user preferences determined in
21 advance by the called party. Or by default, all optional data received could either be
22 stored for later retrieval by the called party or stored and transmitted to the called party
23 personal communicator device along with the caller identifying data. The paging
24 transmission can be encoded at the paging transmitter to economize on valuable
25 transmission time, and then later decoded on a real time or delayed basis within the
26 receiving called party personal communicator. Private flagged caller id data and optional
27 messages may be automatically omitted from storage at the message center or omitted
28 from transmission to a personal communicator device.

1 **STORED VOICE COMMUNICATOR WITH TEXT HEADER INFORMATION DISPLAY**

2 Incorporated herein by reference is US 5,390,362 issued to Modjeska et al. This
3 patent discloses a method of combining voice and data into a message format that can
4 be sent to a pager capable of receiving a combination voice and data message. A called
5 party may selectively review header information corresponding to the calling party prior
6 to listening to any received voice message. A paging transmitter such as described in
7 this disclosure can be modified to incorporate a caller id or ANI decoder (207) or fax
8 signal decoder (209) in automatic telephone input (202) that can receive data
9 automatically from the PBX or PSTN (108) and store this data in paging terminal
10 controller memory (232). Voice synthesizer (208) can playback for the calling party a text
11 to speech synthesized representation of caller id or ANI data and ask whether the data
12 should be sent with the paging message. For example, the voice synthesizer (208) can
13 receive textual caller id or ANI data such as "555-1212 John Smith" from the ANI or
14 Caller ID decoder and then generate the following instructional message to the calling
15 party, "Press or say 'ONE' if you wish for '555-1212 John Smith calling.' to be
16 transmitted. Press or say 'TWO' if you wish this information to be transmitted and
17 marked urgent. Press or say 'THREE' if you wish for this information to not be sent and
18 you wish to enter some other data from your touchtone keypad or keyboard." The calling
19 party, upon hearing the synthesized voice annunciation, then can select which caller
20 identifying data should be sent. In the case of a stored voice paging system, upon
21 hearing confirmation of the desired caller identifying data, the calling party would then be
22 instructed to leave a voice message, which would be stored in the voice store and
23 forward module (216). The confirmed caller identifying data would be stored in memory
24 232 to be linked with the voice message data stored in memory 224 for transmission
25 from transmitter base station 226 to a selective call receiver. In the case of a paging
26 system equipped with a fax store and forward module 216 and fax signal decoder 209,
27 fax header information as previously described could be received and stored in memory
28 232, fax data could be received and stored in memory 224, and the contents of
29 memories 224 and 232 could be transmitted by transmitter base station 226 to a

1 selective call receiver.

2
3 In US Patent 5,283,818 is shown a message system which describes a system
4 linking textual data with voice messages, and is incorporated herein by reference. Such
5 an apparatus could be modified to incorporate the transmission of caller identifying data
6 and voice data to a stored voice paging receiver, via a call from the message center to a
7 paging transmitter via the PSTN as previously described. In addition, to economize on
8 minimizing the time spent connecting with a paging center, the messages received at
9 the message center could be queued for batch transmission either during offpeak
10 periods or periodically. Exceptions could be made for urgent message transmission that
11 could occur without waiting for the message queue transmission.

12
13 Another patent incorporated herein by reference is US 5,258,751 issued to
14 DeLuca et al. Message storage slots can include caller identifying data display which
15 has been transmitted to a selective call receiver or personal communication device as
16 discussed hereinbefore. Any corresponding voice or other message data can then be
17 displayed or annunciated after the user selects the desired message for review.

18
19 Upon receipt at the personal communicator device, the user could scroll through
20 the received messages such as described in US 5,285,493 issued to Wagai et al. and
21 incorporated herein by reference, or by numerous other methods discussed in the
22 various personal communicator apparatus described by reference or example herein.

23
24 The messages could be stored chronologically, with resequencing of the
25 previously stored messages occurring automatically upon receipt of any new message
26 or deletion of any previously recorded message. Alternatively, the messages with the
27 caller id header data could be selectively stored as determined by the user in a number
28 of ways. The messages could be stored based upon preselected criteria. For example,
29 all messages determined to be of an urgent nature or from a particular communicant

1 could be automatically stored in the firstmost message storage slot positions. In another
2 embodiment, all messages could be analyzed and then stored sequentially in an
3 ascending or descending order, based on the caller id header data presented. US
4 Patent 5,225,826 is incorporated herein by reference and discloses a selective call
5 receiver with an integral time of day clock. Messages received with identical header data
6 records could be stored according to the time and date received within the selective call
7 receiver, the time and date data present in the header data, or according to urgent
8 indicators contained in the header data.

9 10 **TEXT TO SPEECH CONVERSION OF CALLER ID HEADER DATA WITHIN A** 11 **PERSONAL COMMUNICATOR DEVICE**

12 In another embodiment, the textual information received at the personal
13 communication device could be applied to a codec within the personal communicator
14 device which is particularly suited to visually impaired persons. Application of a text to
15 speech codec which converts received caller id signals to audible speech signals is well
16 known in the art, as shown in US 5,289,530 issued to Reese and incorporated herein by
17 reference. Such a personal communicator device could be manufactured without a
18 display member to reduce manufacturing costs for specialized purposes.

19
20 In the case of a stored voice message which is transmitted to a stored voice type
21 called party personal communicator without a display member, textual caller identifying
22 data could be annunciated. Such a device could also employ a display member that was
23 capable of selectively or simultaneously displaying caller identifying data received at the
24 personal communicator device.

25 26 **COINCIDENCE DETECTION WITHIN A PERSONAL COMMUNICATOR DEVICE**

27 Data representative of caller id information may be used at the called party
28 personal communicator as key record data which could comprise the notification display
29 or could generate some other associated notification means within the called party

1 personal communicator in response to receipt of the caller identifying portion of the
2 message. The personal communicator device could employ a coincidence detector
3 which may generate a number of notification events in response to a match with
4 prestored data or user preferences compared against the caller id data received. For
5 example, upon detecting that a coincidence existed with a prestored data record, a
6 prestored visual image of the calling party could be displayed. In another instance, a
7 coincidence detection within the personal communicator device could require a called
8 party to enter a personal identifying entry before the confidential message could be
9 reviewed. In yet another embodiment, a coincidence detection could inhibit any
10 associated message transmitted from a message center from being reviewed by the
11 called party at the personal communicator device. In yet other embodiments, received
12 fax header information or Email addresses could be compared against a prestored
13 directory within the personal communicator device to display or annunciate other
14 corresponding data records.

15 16 **EMBODIMENT USING BLOCKED CALLER ID DATA**

17 Upon receipt of a "blocked" caller id data such as described in LSSGR - Class
18 Feature: Calling Identity Delivery Blocking Features - FSD 01-02-1053, US 5,341,411
19 issued to Hashimoto entitled Caller ID Blocking Method and Processing System, and US
20 Patent 5,161,181 issued to Zwick entitled Automatic Number Identification Blocking
21 System (all incorporated herein by reference and subject to modification with the
22 inventions herein), the personal communicator device could respond by not storing the
23 message at the message center which would have been directed to the personal
24 communicator device. In addition any blocked caller id data could be used at the
25 message center to store and prevent retransmission of the data to the personal
26 communicator device. Alternatively a calling party could selectively omit the transmission
27 of caller ID data by using the blocking signal and sending to the personal communicator
28 device only manually entered data, such as a DTMF signal, a card swipe in a magnetic
29 card reader, a voice message, image or other data in place of caller id data

1 automatically supplied by the telephone company.
2
3

4 **REDIAL MEMORY EMBODIMENT**

5 Received caller id data can be selectively transferred to a data buffer within the
6 called party personal communicator device for redialing, as seen in US 4,924,496
7 issued to Figa and US 4,873,719 issued to Reese, incorporated herein by reference.
8 Logic can be incorporated into the receiving device that distinguishes either positionally
9 or by filtering the numeric data from the alphanumeric data to ensure that only the
10 numeric data was retrieved and transferred to a data buffer for redial instructions. Such
11 redial instructions within a personal communicator device could include the ability to
12 distinguish between a local dialing mode in which caller identifying data corresponds to
13 call-back numbers within the local calling area. In this case, only the local portion of the
14 caller id data representing the calling parties telephone number would be used to
15 generate a dialing instruction from the personal communicator device. In other cases,
16 the entire caller id representing the telephone number of the calling party could be used
17 to generate a dialing signal. This is well known in the art as described in US 4,985,918
18 issued to Tanaka.
19

20 Typically Caller ID data transmitted includes either 7 digit or 10 digit numeric data
21 corresponding to the calling parties telephone. Other recent proposals related to the field
22 of Caller Identification deal with automatic transmission of Caller identification from
23 international callers which may consist of less than the required data to complete a
24 return call to the original calling party but more than 7 or 10 digits.
25

26 In one embodiment, upon receipt of an interstate caller id consisting of a 10 digit
27 numeric caller id number such as 305-555-1212, it is necessary to insert a "1" prior to
28 converting caller id data received into a dial signal for the called party to return the call
29 from a cellular telephone device which may be integral or connected to the personal

1 communicator device. Such caller id data as described herein would not complete a
2 dialing signal unless the user manually dialed the digit "1" before the remaining digits
3 were dialed out. As a function of the improved redial circuit in this embodiment, any ten
4 digit caller id data received and stored could automatically be preceded with a digit "1" at
5 the personal communicator device rather than requiring manual entry by the called party
6 prior to dialing. Additionally, in response to receipt of an international caller id numeric
7 sequence, the international caller id data could be preceded by a country code and
8 international calling code like "011" such as is conventionally used. In an alternative
9 embodiment, such additional calling code data could be appended at the message
10 center or at the paging center prior to transmission to a personal communicator device.
11 In some cases a called party may wish to call in first to a long distance service such as
12 1-800-CALLATT, then enter their account code and pin, and then redial the caller id
13 number received.

14
15 In the case where a credit call should be made as described above, the personal
16 communicator device may not automatically insert any special calling codes to be
17 appended to the caller id data received, but instead may use the caller id data as
18 received for redial data after the other credit calling data is transmitted. In the case
19 where special calling code data has been appended prior to receipt at the personal
20 communicator device, the personal communicator device could strip away or disable the
21 calling codes such as "1" or "011" and only generate the necessary calling sequence
22 corresponding to the telephone number of the original calling party, using the last 10
23 significant digits in the case of a domestic call. In any case such additional features
24 would be very beneficial to the user of such an equipped personal communicator device
25 with a redial feature.

26
27 Where caller identifying data received is comprised of speech signals that
28 represent the calling parties telephone number and/or name, such data could be stored,
29 transferred and used as a redial instruction from the personal communication device to

1 a communication network which was well equipped to receive voice commands for a
2 dialing instruction, such as is seen currently in the Sprint Voice Foncard service and
3 other services, incorporated herein by reference. Selectively or in combination, the
4 speech signals representing the name or telephone number of the calling party could be
5 generated by the personal communicator device to communicate redial instructions to a
6 communication system with voice recognition or with speech command capability.

7 8 **MEET ME SERVICE EMBODIMENT**

9 Such features could be useful as well in a "Meet me" service in which a calling
10 party is placed on hold at the message center. Typically a calling party is instructed to
11 remain on hold and may be asked to enter their telephone number by DTMF entry or
12 entry of a special signal which constitutes a "meet" request. Then the DTMF or special
13 signal is sent through a paging transmitter to a paging receiver. When the paged
14 communicant receives the page, they may call back on a telephone link to the meet me
15 center to be connected with the calling party. However it requires manual entry by the
16 calling party of the call in number of the meet-me service and the called party cannot
17 always remember or know who may be calling by the telephone number alone. Such
18 information is critical for the called party to properly screen meet requests. One system
19 incorporated herein by reference is described in US 4,172,969 issued to Levine et al. In
20 this system, the caller is instructed to dial his calling number. The signals are then
21 conveyed over the telephone line to the receiver telephone answering device to be
22 transmitted to a mobile receiver unit. Another such system is described in part by US
23 5,208,849 issued to Fu, incorporated herein by reference which can be adapted to the
24 inventions herein. Another Meet me type system is described in US 5,327,480 issued to
25 Breeden, and 5,151,929 issued to Wolf incorporated herein by reference which can be
26 adapted to the inventions herein.

27
28 By incorporating the automatic transmission of calling party number and name in
29 an alphanumeric paging network for example, the called party can more accurately

1 determine who is calling before accepting the "meet" invitation. In the case where a
2 voice Caller ID is supplied by the terminating central office to the meet me service at the
3 message center, the called party can hear an annunciation of the callers identity from a
4 personal communicator device suitable for the replay of such information.

5
6 The called party personal communicator receives a "meet" request from the
7 paging center which consists of at least the meet request signal supplied automatically
8 or a meet request signal initiated by the calling party. In addition to, or in place of the
9 meet request signal, the caller id data received and stored at the message center
10 corresponding to the calling party on hold can be transmitted to the personal
11 communication device. The calling party could also at this time enter other additional
12 information such as an urgent indicator or special code agreed upon between the calling
13 party and the called party for transmission along with the caller id data and/or meet
14 request. In any case, the calling party is instructed to remain on hold while the called
15 party is paged for a possible meet by the paging center.

16
17 If the called party does not respond within a prescribed period of time, the calling
18 party can then additionally be instructed to leave optional data such as a voice message
19 that can either be retrieved later by the called party, or can be transmitted to the called
20 party personal communicator after the caller disconnects. In another embodiment if the
21 calling party does not wish to wait any longer for the called party to call in to the meet
22 me center, then the called party can interrupt the meet me service by for example
23 depressing the # sign.

24
25 At this point the message center at the meet me service can instruct the caller to
26 enter optional data such as a voice message for storage and/or transmission to the
27 called party. After the calling party disconnects from the message center at the meet me
28 service, the message center can send an additional signal in a second transmission to
29 the personal communication device through a paging center or integral paging

1 transmitter. This signal can indicate that the calling party hung up and that a "meet" with
2 the calling party at the message center is not possible. This transmission can also
3 include any optional voice or other data left by the calling party.
4

5 Such data which is to be transmitted can be incorporated with the previously
6 stored caller id data at the message center for transmission to the personal
7 communicator device. Alternatively the optional data such as a voice message can be
8 transmitted to the called party personal communicator device and appended to, or
9 associated with received caller id data from the calling party.
10

11 In the above described or similar systems, the detected caller id information can
12 be transmitted automatically to the personal communicator device in a more efficient
13 manner that will provide more information to the called party and relieve the calling party
14 of inconvenience.
15

16 Of course caller id blocking options could be employed as previously described in
17 this application. Other variants of these "meet me" services could also easily employ a
18 caller id detector to transmit the caller identifying data automatically. For sake of brevity,
19 these various systems are not described in detail although it is believed that those
20 skilled in the art can adapt the methods described herein.
21

22 **AUTO DIALING PERSONAL COMMUNICATOR EMBODIMENT**

23 The paging receiver device could also be a dedicated paging receiver with a
24 DTMF signal generator such as seen in US 4,490,579 issued to Godoshian, 5,099,507
25 issued to Mukai et al. 5,280,516 issued to Jang or 5,212,721 issued to DeLuca et al.,
26 incorporated herein by reference. Received caller id data received could be used to
27 generate a dialing signal in an acoustically coupleable dialer device, or via an external
28 telephone line connector within the called party personal communicator. The received
29 caller identifying data could be digital data representative of numeric information

1 corresponding to the call-back number of the calling party. Such received digital data
2 could be applied to a DTMF generator to output a dialing signal.

3
4 Alternatively, the received caller identifying data could be audible DTMF signals
5 which were recorded as audible signals at the message center after manual entry by a
6 calling party. In another embodiment, textual caller id data could be converted to audible
7 DTMF signals at the message center to be transferred to a voice paging center as
8 audible signals. Upon receipt at the paging center, the audible signals could be
9 transmitted to a personal communication device along with any optional data. The
10 audible DTMF sounds and optional data could be stored and replayed through a
11 speaker.

12
13 Alternatively the DTMF sounds could be converted to a dial signal for a cellular
14 telephone device or via a telephone line connector. The received audible DTMF signals
15 could be applied to a DTMF decoder and character generator within the personal
16 communicator device to display the audible DTMF sounds received. This method could
17 be particularly useful in that the personal communication device would not require a
18 DTMF generator to create a dialing signal. In addition, audible DTMF sounds could be
19 prestored into a personal communication device or dialing apparatus by means of a
20 computer download interface that releasably electrically or acoustically coupled to a
21 dialing apparatus or personal communicator with a memory means, control means and
22 data input receiving means.

23
24 These audible DTMF sounds could then be used as described previously to
25 generate an audible dial signal for acoustical coupling, or converted to an electrical
26 signal for other dialing means.

27
28 In a different embodiment, the received and stored DTMF sounds could be
29 applied to a DTMF decoder and character generator and optional text to speech unit to

1 display or annunciate the data received. The personal communicator or dialing
2 apparatus could interpret the stored audible DTMF signals within the personal
3 communicator or dialing device and generate a display or voice annunciation of the
4 telephone number information. This could be accomplished by a standard DTMF
5 decoder circuit and character generator such as described in US Patent 4,882,750
6 issued to Henderson et al. incorporated herein by reference and a text to speech unit
7 well known to those skilled in the art.

8
9 This improvement could be useful in autodialer devices such as described in this
10 patent. For example, a circuit commonly used to store voice signals such as the Radio
11 Shack, part number 276-1324 or Radio Shack part number 276-1325 could be used to
12 store and replay the received DTMF signals through a transducer in a conventional
13 autodialer. The audible DTMF signal could be received by a sound input means which
14 was connected to the circuit during a programming mode. During a replay mode, the
15 DTMF signals previously programmed could be replayed through a transducer attached
16 to the autodialer, or the DTMF signals could be transferred to a transmitting means that
17 could generate the DTMF signal to a communication link such as in a cellular or landline
18 communication system.

19 20 **COMBINED PAGER / RADIOTELEPHONE EMBODIMENT**

21 The paging receiver device could alternatively be contained within a cellular
22 telephone device as in US 5,117,449 issued to Metroka et al. or in US 5,148,473 issued
23 to Freeland et al. in which a paging and cellular radio telephone function are combined
24 in a single device. These patents are also incorporated herein by reference.

25
26 When the paged party receives a page, the caller id data can be stored for later
27 use and an alert tone, a vibration, a visual indication or a voice message can alert the
28 called party who may be engaged in a telephone conversation on the cellular telephone.
29 When the paged party wishes to return the call from the calling party after hanging up,

1 the stored caller id data can be selected and recalled for dialing at the touch of a button.

2 Of particular utility, alphanumeric caller id data received can textually identify a
3 calling party to aid in selection of a desired callback number and the included numeric
4 caller id information can be utilized to generate a dialing signal. In a number only caller
5 id transmission the number only will be supplied to the combined pager/radiotelephone.
6 In this case, the received numeric information can be transferred to a comparing means
7 and compared against a prestored directory in the device. In this manner, the paged
8 party can more easily identify the caller and return the call more efficiently. US
9 4,924,496 issued to Figa describes one such method in greater detail and has already
10 been incorporated herein by reference.

11 12 **PCMCIA PAGING RECEIVER EMBODIMENT**

13 Another alternative embodiment using the claimed inventions can be seen in US
14 5,043,721 issued to May which discloses a paging accessory using a PCMCIA interface
15 which is connected to a personal computer or integrated in a computing device. This
16 patent is incorporated herein by reference.

17 18 **STORED VOICE PAGING RECEIVER AND SYSTEM EMBODIMENT**

19 Caller identifying data received may include textual data representative of caller
20 id data automatically supplied from the PSTN as described previously, or may include
21 some other textual data such as received from a DTMF entry by the caller at a message
22 center or paging center, an E-Mail message or document received with an embedded or
23 compressed voice message, or other data. For example, textual data representing the
24 identity of the sending party could be represented by an E-mail address such as
25 HASHIMOTOK@HCJ.COM. The message could be transmitted to a selective call
26 receiver along with a voice message which was sent by a calling party's personal
27 computer equipped with a sound board with appropriate software. In addition, the caller
28 identifying information could be a particular iconographic representation of the calling
29 party such as described in the Magic Cap software environment using so called

1 Telescript technology available from General Magic and incorporated herein by
2 reference, or a still video image of the calling party transmitted with the voice message
3 by the calling party premises equipment.
4

5 For example, visually displayable images transmitted after the message center
6 device has gone offhook in response to a ringing signal could be received and stored
7 with an associated voice message. One such implementation particularly adapted to
8 simultaneous voice and visual data transmission that is currently being implemented is
9 known as VoiceView. Incorporated herein by referenced and manufactured and licensed
10 by Radish Communications Systems, Inc. out of Boulder, Colorado. VoiceView lets
11 calling parties transmit visual images along with voice data in a standard POTS
12 environment, which in the preferred embodiment could be captured and stored in a
13 memory means at the message center for later transmission to a paging receiver or
14 personal communication device. Alternatively, in an ISDN environment, simultaneous
15 transmission of voice and image data could occur in a similar fashion such that
16 message or caller identifying visual data could be stored along with a voice message for
17 later transmission to a communication device.
18

19 This information could be displayed on a display member upon receipt of the
20 message at the stored voice communication device in advance of annunciating, or
21 simultaneous with, annunciation of the voice message.
22

23 Alternatively, the caller identifying information could be used to generate an
24 audible alert means such as prestored sound data contained within the communication
25 device and applied to a comparing means that corresponds to choices made by the
26 called party. Or received caller identifying data could be applied to a text-to-speech
27 generator contained within the paging receiver and annunciated to the called party. US
28 Patent 4,975,693 issued to Davis et al. is incorporated herein by reference.
29

1 Alternatively, the caller identifying data received at a paging center or message
2 center could be applied to a data generator which would compare the caller identifying
3 data received and generate predetermined character strings for transmission to a
4 communication device such as described in US 4,962,377 issued to Wallace et al. and
5 incorporated herein by reference.
6

7 Alternatively, the received textual data could be converted to a text to speech
8 converter at the paging center prior to transmission to the stored voice communication
9 device.
10

11 Upon receipt of a message at the communication device, only the caller
12 identifying data may be displayed or annunciated prior to annunciation of the voice
13 message after selection by the called party. In addition, such voice messages received
14 from certain parties could be marked as of a confidential nature by the calling party so
15 that a password would be required by the called party to hear the message.
16

17 In another preferred embodiment, the personal message center could comprise a
18 voice mail center, a personal computer or a conventional telephone answering machine
19 as previously described and well known in the art. In such systems, the received caller id
20 data could be used with a comparing means at the voice mail center, personal computer
21 or conventional telephone answering machine to selectively transmit associated voice
22 message data without the caller identifying data. Such a feature is a substantial
23 improvement over existing paging systems. This is a departure over the prior art in that
24 prior art voice message systems do not transmit voice data to conventional stored voice
25 paging receivers. One of the main advantages of such an approach is that the cost of
26 the stored voice paging receiver is reduced because there are no display means
27 required in the voice paging receiver.
28

29 Alternatively, the called party could preselect which calling parties could require a

1 password upon receipt and prior to playback. Callers from a particular calling group
2 could be assigned with an automatic annunciation attribute in which any received calls
3 from this group would automatically be broadcast, no matter when the message was
4 received. See US Patent 5,073,767 issued to Holmes et al. and US Patent 5,146,217
5 issued to Holmes et al. which are incorporated herein by reference.
6

7 In one embodiment the stored voice communication device may receive all voice
8 messages and based upon the caller identifying data or password data also received,
9 may selectively broadcast through a speaker or playback only through a sound output
10 accessory such as an earphone, based upon the desired mode of annunciation
11 predetermined by the called party with annunciation mode instructions. Such instructions
12 could be as data associated with prestored caller identifying data and the voice
13 message, or by an annunciation mode switch that was connectable to a comparing
14 means.
15

16 If for example, a message received was determined to be of a private nature not
17 available for broadcast, the message could not be heard unless an earphone was first
18 attached to the communication device and the message was selected for playback.
19 Alternatively, the communication device could sense that the earphone was attached
20 and automatically playback the message through the earphone without any further
21 selection. See US Patent 5,075,684 issued to DeLuca and incorporated herein by
22 reference.
23

24 In addition, it may be useful for messages received and stored in the personal
25 communication device to be transferred for archival at a personal computer. Such a
26 personal communicator could be fitted with a serial, parallel, infrared or other
27 communication link and appropriate data transfer capability so that received messages
28 could be transferred to another device for speech to text transcription, archival voice
29 message storage or other functions.

1
2 The stored voice communications device includes a means for receiving
3 transmitted voice messages, receiver identifying control information, and source
4 identifier information such as caller id, ANI, synthesized caller id, DTMF, image, or the
5 like. Further the device may include a first audio output means such as an integrated
6 speaker, an optional second audio output means such as an earphone jack, a third
7 optional text to speech output means and a codec means to convert data received into
8 audible voice data. Further the device may include a selection and storage means for
9 prestoring called party annunciation selections, and a comparing means to match caller
10 identifying data received with the prestored called party annunciation preferences.
11

12 A first switch means allows a received voice messages to be delivered using the
13 first audio output means by default, unless otherwise directed by prestored called party
14 preferences .
15

16 A second switch means allows received voice messages to be delivered using
17 the second output means by default, unless otherwise directed by prestored called party
18 preferences.
19

20 A third switch means allows received caller identifying data received to be
21 delivered to a text to speech conversion means, although it is recognized that such data
22 could also be applied to such a conversion means automatically by default rather than
23 based on the switching means. US Patent 4,742,516 issued to Yamaguchi shows one
24 method of text to speech translation and is incorporated herein by reference. Another
25 US Patent 4,716,583 issued to Groner shows another method of text to speech
26 translation and is also incorporated herein by reference.
27

28 The stored voice paging receiver also includes a selection and storage means to
29 allow a user to predetermine which corresponding source identifiers will utilize the first

1 audio output means, the second audio output means or the third text to speech
2 conversion means. In addition, based upon the caller identifying data received, the
3 communication device could determine which order voice messages would be stored
4 and accessed in a message storage means. For example, all the messages marked
5 urgent could be accessible first, or the messages could be retrievable based upon the
6 time sent, or based on the identity of the caller. All callers that were determined to be
7 family members may be prioritized differently than callers that were business contacts.

8
9 A password means in the communication device allows for preselection of a
10 password by the called communicant and entry of a password prior to annunciation of
11 messages determined to be from a calling party that may be of a private nature.

12
13 A comparator means in the stored voice communication device compares the
14 received and/or stored voice message source identifier with predetermined user
15 preferences and stores and delivers the received messages based on the
16 predetermined user preferences.

17
18 Further as previously described, the stored voice personal communicator could
19 also include a dial function in which the speaker or transducer used to annunciate voice
20 messages could also be used to acoustically couple the communicator and to generate
21 a dial signal as has been described hereinbefore. Audible DTMF signals received at the
22 stored voice paging receiver, or digital numeric data converted to DTMF at the
23 communicator could generate a dialing signal.

24
25 In Figure 1b is shown an improved stored voice paging receiver with a display for
26 caller identifying textual or image data and a text-to-speech unit for converting textual
27 data received into audible voice signals. Also the device may include a coincidence
28 detector to compare caller identifying data received with prestored data records.

1 In the functional block diagram in Figures 1a, 1b and 1c the paging receiver 1010
2 of the preferred embodiments include a receiving means 1012, a decoding-controlling
3 means 1014, a memory means 1050, an audio amplifier 1040, a sound output means
4 1037, an input switch module 1042, an energy conservation means 1020, and a
5 converting means 1038. An antenna 1024 receives paging information in the form of
6 selective call signals, information comprised of speech signals representative of a voice
7 message and information comprised of caller identification data for display or
8 annunciation before, during or after annunciation of the voice message. The antenna
9 1024 is coupled to receiving means 1012 that is subject to the control of decoder 1014.
10 The decoder 1014 not only controls receiving means 1012, but may also operate
11 receiving means 1012 on an intermittent basis to extend the life of battery 1016 through
12 energy conservation means 1020. The receiving means 1012 detects the presence of
13 electromagnetic energy representing the paging information and applies the information
14 to the converting means such as coder-decoder 1038. Operating under control from
15 decoder 1014 (line 45), the coder-decoder 1038 converts the received signals, such as
16 an audio speech signal to a stream of binary bits and reconverts the stored binary bits to
17 a replica of the original received analog signal, such as synthesized audio speech
18 signals. A microcomputer 1026 functions as the decoder 1014 and is comprised of a
19 microprocessor 28 and a read only memory (ROM) 1030. ROM 30 includes the
20 necessary instructions to operate microprocessor 1028 to perform the functions as
21 described below. The microcomputer 1026 uses microprocessor 1028 as a software
22 decoder for processing the received signals in real time according to predetermined
23 software routines. Such routines could provide for detection of specific demarcation
24 codes that distinguish audio or textual caller identification data from audio voice
25 messages for storage, annunciation and replay.

26
27 After the paging receiver is selectively identified, microprocessor 1028 accesses
28 ROM 1030 for determining the correct instructions contained in that memory for
29 processing the received signals, converting the analog voice signals to digital form,

1 storing the digital form of the voice signal, storing the caller identification data, displaying
2 the caller identification data on the display means 1077 and other functions. For
3 example, text to speech synthesis means 1075 can convert bit representations of textual
4 caller identification data received with voice data into synthesized voice signals to be
5 annunciated through audio amplifier 1040 and sound output means 1037 under the
6 direction of microprocessor 1026 and input switch module 1042. For example, upon
7 hearing a default alert signal from sound output means 1037 indicating receipt of a
8 message, the subscriber could press "PLAY" 1056 and the synthesized voice
9 annunciation of caller identification information would be retrieved from the memory
10 means and annunciated, such as "John Smith - 555-1212 called". Then upon a second
11 depression of the "PLAY" button, the stored voice message may be retrieved from the
12 memory means 1050 and replayed for the subscriber. In another embodiment, caller
13 identification data received could be displayed on a display means 1077 when a
14 message was received, or in response to scrolling through a list of messages previously
15 received and selected using key input selector 61, touch-screen input from display
16 means 1077 or other keyboard selections and software as is known in the art.

17
18 Upon selection of a particular caller identifying record, the microcomputer 1026
19 could retrieve the corresponding voice message from the memory means 1050 for
20 annunciation. Additionally under the direction of the microcomputer 1026, a coincidence
21 detector 1097 could be employed to compare caller identifying data with prestored data
22 records in memory means 1050. Upon determining a matching record, microcomputer
23 1026 could cause caller identifying data and / or any associated record or annunciation
24 alert to be automatically displayed on display means 1077 or annunciated using sound
25 output means 1037. Additionally, key input module 1042 could include a synthesize
26 mode key 1078 in which textual data entered by keyboard 1053, stored on memory
27 means 50 or received from receiving means 1012 could be selectively converted from
28 text-to-speech for annunciation.

1 In the illustrated embodiments, the coder-decoder 1038 (hereinafter referred to
2 as CODEC) provides for the digital-to-analog and analog-to-digital conversion of speech
3 signals. The CODEC 1038, such as an adaptive delta modulator, converts or encodes
4 an audio input signal (line 44) to a digital data stream (line 46) for storage in memory
5 means 1050, and reconverts or decodes a digital data stream (line 48) to reconstruct an
6 audio signal (line 21). Under control of decoder 1014, the CODEC's digital output is
7 stored in memory 1050 and retrieved on line 1048 to reconstruct a synthesized audio
8 signal on line 1021, thus closely replicating the real time audio signal in both amplitude
9 and frequency. One example of such a coder-decoder is disclosed by N.S. Jayant in the
10 publication "Adaptive Delta Modulation with a One-Bit Memory", Bell System Technical
11 Journal, Vol. 49, No. 2, Mar. 1970. To conserve power, most of the CODEC 1038 is
12 turned off when there are no read/write operations to the memory. The receiving means
13 1012 is further coupled by line 1023 to an audio amplifier 1040. Operating in response
14 to decoder 1014, the real time audio signal on line 1023 is applied to audio amplifier
15 1040 which supplies the analog signals to sound output means 1037. In particular,
16 decoder 1014 controls audio amplifier 1040 via line 1062 to apply either the real time
17 audio signal on line 1023 or the synthesized audio signal on line 1021 to sound output
18 means 1037.

19
20 Decoder 1014 is coupled to memory 1050 which serves to include information for
21 decoding the received information and for storing information received from CODEC
22 1038. The CODEC 1038 provides the analog-to-digital conversion in memory 1050 as
23 digital voice messages. In this embodiment each digital voice message is stored in
24 conjunction with associated caller identifying data. As previously described, such data
25 could be textual, synthesized audio or graphical data. This associated caller identifying
26 data can be used to selectively access voice message records before selecting a
27 particular voice record for replay. A plurality of digital voice messages can be stored in
28 memory 1050. The decoder 1014 functions to alert the paging user, and to store, recall,
29 and playback voice messages, as well as to store, recall, and playback caller

1 identification data.

2
3 The paging receiver of Figures 1b and 1c has a capacity of storing voice
4 messages and providing them to audio amplifier 1040 according to the state of a
5 plurality of inputs, such as the state of the control switches of input module 1042, the
6 state of annunciation instructions ascertained by coincidence detector 1097 and
7 prestored data records contained in memory means 1050, and particular encoded
8 annunciation instructions received by receiving means 1012 that comprise part of the
9 message data.

10
11 A switch interface 1018 provides input capability for control switches 1054-1078
12 and keyboard 1053. Display means 1077 also may employ a switch interface means to
13 allow for touch screen selection for data input, menu selection and the like. Illustratively,
14 control switch 1054 is an on/off switch for controlling power from battery 1016. Control
15 switch 1056 is a play switch for playing back voice messages previously digitized and
16 stored in memory 1050. Control switch is a reset switch to reset the paging receiver
17 system and to monitor any real time audio signals currently being received. Control
18 switch 60 is a mode switch for operating the decoder in one of three modes. These
19 modes are the silent, push to listen (PTL) and normal modes.

20
21 The battery 1016 is shown connected to decoder 1014 through switch interface
22 1018. Battery 1016 provides power to decoder 1014 through an energy conservation
23 means 1020, such as a DC to DC converter. Decoder 1014 is additionally connected to
24 a code memory 2102 which stores predetermined address information to which the
25 paging receiver is responsive. Code memory 1022 can also store such information as
26 the sampling rate for digitizing the received audio messages. Output 1062 from decoder
27 1014 controls whether real time audio signals on line 1023 from receiving means 1012
28 or synthesized audio signals on line 1021 from CODEC 1038 are applied to audio
29 speaker 1037. Communication between receiving means 1012 and decoder 1014 is

1 achieved via line 1047. Selective call signals for the decoder 1014 are received by
2 receiving means 1012 and passed to decoder 1014 through line 1047.
3

4 The operation of the paging receiver shown in Figure 1b is such that the receiving
5 means 1012 is capable of receiving messages in any of several message formats
6 through antenna 1024. The decoder 1014 responds to the received signals to analyze
7 the data and select one of several decoding schemes for appropriately decoding the
8 incoming information received by receiving means 1012. As is well known with paging
9 devices, the resulting decoded signal is tested for comparison with a designated pager
10 address contained in code memory 1022. On detecting correspondence between the
11 received and decoded signal and the address in code memory 1022, the decoder 1014
12 instructs the CODEC 1038 to digitize the real time analog voice signals that follows for
13 storage in one memory 1050. The preferred embodiments described herein are not
14 specifically limited to analog systems but could also be adapted to a digital stored voice
15 paging system in which voice or image data was transmitted in a compressed or
16 uncompressed format. An alert output signal may be produced by the decoder 1014 to
17 generate an alert indication to the pager user that a message has been received and
18 stored. In particular, the alert output signal from the decoder 1014 is supplied to audio
19 amplifier 1040 to produce an audible signal from the sound output means 1037
20 indicative of receipt of a message. Alternatively the decoder 1014 can supply alert
21 signals or data to audio amplifier 1040 and sound output means 1037 and/or display
22 means 1077 in response to alert output instructions contained in prestored data records
23 in the memory means 1050 used in conjunction with coincidence detector 1097, or in
24 response to alert instructions or caller identifying data received as part of the message
25 from receiving means 1012 via line 1047.
26

27 If the user responds to the message alert, the user has the ability to hear the
28 message in real time, depending upon the position of mode switch 1060, or has the
29 ability to hear only the associated caller identifying data until the play key 1056 is

1 depressed again. In another alternative embodiment, calls received which are
2 determined to be confidential by the coincidence detector 1097 and memory means
3 comparing against the received caller identifying data can be inhibited from playback
4 until such time as a personal identification code is entered by the user using the
5 keyboard 1053 or display means 1077 for example. In another embodiment, the
6 message received could include a code with the message data that creates a
7 confidential condition such that a personal identification code must be entered before
8 the particular message can be annunciated. Alternatively, the user could require all
9 messages received to require entry of a personal identification code. Such security
10 features are particularly useful in case the user wishes to prevent other persons in the
11 immediate vicinity from inadvertently hearing confidential messages, or in the case
12 where the paging receiver is lost.

13
14 If the mode switch is in the normal mode, upon receipt of a voice message, the
15 user hears an alert followed by the voice message. Simultaneously, the message is
16 stored into a storage area in the memory means 1050, depending upon the bit rate of
17 the CODEC 1038.

18
19 Referring to Figure 1c, another embodiment of the illustrates a sound input
20 means 1081 which may have an integrated microphone 82 or a releasably connectable
21 sound input means 1083. This allows sound data such as spoken voice or personal
22 computer files such as .WAV files to be uploaded to the paging receiver device 1010 for
23 storage in the memory means 1050 for alert annunciation. Such custom annunciations
24 could be generated in response to particular caller identifying data received as
25 determined by the coincidence detector 1097 and prestored data records in memory
26 means 1050, or could be stored in code memory for default alert annunciation signals
27 upon receipt of a message or a particular condition within the paging receiver 1010
28 controlled by microcomputer 1026. Input switch module 1042 includes a "RECORD"
29 function key 1079 which can be used to start recording or uploading of any sound

1 through the sound input means 1081 when the paging receiver 1010 is in a sound
2 recording/uploading mode.

3
4 In addition, Figure 1c includes a DTMF tone decoder means 1080 which can
5 decode DTMF audio signals received as part of the message data from receiving means
6 1012. The audio signals received can be supplied to the decoder means 1080 and
7 corresponding numeric textual data can be displayed on the display means 1077 or
8 supplied to a coincidence detector 1097 for comparison against prestored data in
9 memory means 1050. Corresponding matching data records can then be annunciated
10 and/or displayed prior to annunciation of the voice message.

11
12 In Figure 1d is shown an autodialing type paging receiver in which DTMF data
13 received can be applied to a DTMF tone decoder and text to speech generator in a
14 similar manner as described hereinbefore. In this embodiment, the preferred
15 embodiments herein are especially useful in that a display member is not necessary for
16 the user to determine the identity of the calling party as the telephone number may be
17 annunciated. Such a device may be used in a stored voice paging system, in which
18 DTMF entries are manually entered in conjunction with a voice message for
19 transmission to an autodialing type paging receiver. The DTMF tones can be
20 annunciated as voice representations of DTMF digits received. For example, if the
21 DTMF tone detector receives the dual tone frequencies of 1209 Hz and 697 Hz then the
22 text to speech generator will receive instructions from the tone decoder and the
23 synthesized voice annunciation "ONE" will be heard. Different corresponding synthetic
24 voice messages can be stored in ROM in the text to speech generator for each of the
25 various DTMF tone combinations and generated in response to a depression of the
26 "SPEAK" button or automatically generated in response to receipt of a message when
27 decoded by the DTMF tone decoder. The DTMF signals received may be stored in a
28 memory as DTMF audio signals for playback through a sound signal generator and
29 speaker or may be converted to digital representations of the DTMF signals for

1 application to a DTMF generator (not shown) for later redial.
2

3 In one preferred embodiment, textual caller identifying data such as name and
4 telephone number information is received by the receiving means along with any
5 associated voice message in a stored voice paging receiver. The microprocessor can
6 apply the received caller id data to a text to speech unit and display means for
7 annunciation and display. Each subsequent message received can be stored in a
8 memory means contained in a detachable memory as described in Figure 5a. The
9 detachable memory means may be a PCMCIA memory card that may allow transfer of
10 voice messages received from a voice mail center for subsequent archiving in a
11 personal computer or the like.
12

13 The stored voice paging receiver can also have a detachable keyboard or other
14 input means to allow for entry of memory records that can be used by a coincidence
15 detector within the pager, as in a copending application . Upon receipt of caller
16 identifying data, the coincidence detector can compare the caller identifying data against
17 prestored memory records to annunciate or display associated caller identifying data
18 prior to annunciation of the voice message received.
19

20 In Figure 3a is shown the prior art method of receiving and transmitting a voice
21 message to a stored voice paging receiver. In Figure 3b is shown an improvement over
22 the prior art method in which caller identifying data is received, stored and associated
23 with a voice message for transmittal to a stored voice paging receiver.
24

25 In Figures 4a through 4e are shown various alternative embodiments in which
26 caller id data can be utilized within a stored voice paging receiver.
27

28 For example, in Figure 4a when a stored voice paging receiver receives a
29 message, a coincidence detector can generate a prestored audio alert. First, the called

1 party enters textual data and a corresponding audio announcement into the pager in
2 advance. In this case, the number 555-1212 could be entered by a data entry means
3 into the pager, and a voice entry such as "home office" could be spoken into a sound
4 input accessory, for storage in the pager memory. If the caller id data such as 555-1212
5 were received, a coincidence detector would determine a match with the previously
6 entered number and the previously entered audio alert "home office" would be heard by
7 the called party. Upon depression of a play key, the voice message could be heard.
8 "unknown caller", the caller id data could be displayed and upon depression of a play
9 button, the voice message could then be heard.

10
11 In Figure 4b is shown another alternative embodiment in which a voice pager
12 allows a called party to associate certain pin numbers with calling parties. For example,
13 some callers may typically be of a personal or confidential nature. The playback of
14 messages from these callers may require entry of a PIN code prior to annunciation of
15 any message. In this case, a coincidence detector could be employed which analyzes
16 caller id data received and compares against a prestored caller list. When a match is
17 determined, particular caller messages would not be heard until the proper PIN code
18 was entered by the calling party. When the correct code was entered, the caller id data
19 could be annunciated or displayed until such time as the play key was depressed. Of
20 course, the caller id data could be inhibited from display or annunciation until such time
21 as the proper pin code was entered by the called party. In this case then, a default alert
22 signal could be generated in response to receipt of a message that did not indicate the
23 identity of the calling party until the pin code was entered properly. Alternatively, the
24 prompt for the pin code entry could be generated by the pager after the receipt, display
25 and annunciation of caller id data but prior to annunciation of the voice message from
26 the calling party.

27
28 In Figure 4c is shown another alternative embodiment in which a voice pager
29 receives DTMF audio signals along with a voice message. The voice pager could

1 distinguish DTMF signals from the voice message data by use of a DTMF tone decoder
2 means within the pager. The DTMF tone decoder could generate a corresponding
3 textual or synthesized voice alert corresponding to the caller id of the calling party. In
4 addition, the decoded DTMF signals could be employed with a coincidence detector to
5 display or annunciate previously stored matching data records as previously described
6 in Figure 4a. Further, the received audio DTMF signals received could be used in place
7 of a more conventional DTMF generator to generate a corresponding dialing signal for
8 call back to the calling party.

9
10 In Figure 4d is shown another alternative embodiment in which a voice pager can
11 utilize a text-to-speech unit within the pager to annunciate textual caller identifying data
12 received.

13
14 In Figure 4e is shown another alternative embodiment in which a stored voice
15 pager can operate in one of three different modes: Announce mode in which a
16 coincidence detector is employed against all caller id data received automatically upon
17 receipt; silent mode in which a coincidence detector is employed against all caller id
18 data received only upon depression of a play key; and a broadcast mode in which caller
19 id data is displayed and/or annunciated and the voice data is annunciated automatically,
20 without use of any coincidence detector. For example upon receipt of a message when
21 in the announce mode, a coincidence detector could be employed before an alert signal
22 was generated. Upon detection or non detection of a matching record, the appropriate
23 alert signal would be generated and the unit would play the associated voice message
24 upon depression of the play key. Upon receipt of a message when in silent mode, the
25 caller id data could be displayed but not annunciated. When the called party scrolled
26 through the messages received by viewing the display of various caller id data
27 associated with voice messages, he could then press a play key and the coincidence
28 detector could generate an appropriate alert signal. If the play key was depressed again,
29 the voice message could be heard by the called party. Alternatively, a single depression

1 of the play key could cause the annunciation of the caller id data and subsequent
2 annunciation of the voice message. If the pager were in broadcast mode, the caller id
3 data could be displayed and the voice message received would be broadcast to be
4 heard by the called party.

5
6 In Figure 5a, caller identifying data such as name and number data, particular
7 voice or sound data for message alerting, pin code data, iconographic data such as
8 logos or meaningful graphic images, photo images of a calling party or other data is
9 stored in a memory means that is integral to or detachable from the paging receiver.
10 This data could be transferred from a PCMCIA memory card attached to the pager, or
11 an integrated memory within the pager that received data from an input means such as
12 an infrared, serial or parallel connection with another device, or a data input means
13 integrated in the pager such as a touch screen, sound input accessory, keyboard, or
14 some other means.

15
16 In Figure 5b is shown one embodiment of a display member (8) within a stored
17 voice paging receiver (7) in which caller identifying information can be scrolled through
18 prior to selecting a particular message for annunciation. Such a display could be of the
19 type known as a touch screen which allowed also for programming of softkeys for
20 various functions to be performed such as scrolling, data entry, message selection and
21 the like. The particular urgency of a message received could be indicated on such a
22 display by a flashing iconographic indicator (1), the caller id name and number data (4)
23 could be displayed, the duration of the voice message received could be shown (3) and
24 the time the message was received could be displayed (2). In such cases where blocked
25 caller id indicators were received, default message such as "blocked" (6) or "unknown"
26 could be displayed.

27
28 In Figure 5c is shown a caller id memory address register in which caller id data
29 associated with voice messages received can be stored for later recall and display in a

1 stored voice pager. This memory for the caller id data could be contiguous or separate
2 from the memory used for the voice messages received and could be applied to a
3 display as described previously. The voice message stored in memory can be
4 annunciated after selection of a displayed caller identifying record by the called party.
5
6

7 As is shown in Figure 10, telephone 2563 from which a calling party initiates
8 communications interacting with switch 2559, host computer 2557, telephone trunk
9 interface 2553, and voice processing system 2555 in a messaging system. As is
10 further shown in RCC terminal 2551 is a communication to dialing pager receiver
11 2591. Upon receipt of a message at dialing pager receiver 2591 of caller ID or other
12 data an acoustic or other dialing signal can be used to initiate communication with TEL
13 1 2561 through switch 2559 to establish communication with TEL 2 2563 between the
14 called party and the original calling party.
15

16 **Figure 11** provides a simplified block diagram of a telephone network, in
17 accordance with the prior art, which will be utilized to describe some fundamentals of
18 telephony which may be necessary to understand the inventions herein. As is shown,
19 telephone network **9** can be utilized to allow call-originator **11** to utilize telephone **13** to
20 place a telephone call to call-receiver **15**, which utilizes telephone **17** to receive such a
21 call. Fairly elaborate switching networks **19** and **21** connect call-originator **11** and call-
22 originator **15** to central office **23** of telephone network **9**.
23

24 In central office **23**, there is a source of electrical current, identified as talk battery
25 **25**, which is utilized to determine whether or not a particular telephone (i.e., telephone
26 **13** or **15**) is in the "on-hook" or "off-hook" condition. If the handset of a particular
27 telephone is lifted from the cradle of the telephone, the telephone goes from an on-hook
28 condition to an off-hook condition. When a particular telephone is in an off-hook
29 condition, dial tone generator **27** at central office **23** of telephone network **9** is utilized to

1 generate an audible dial tone which indicates to the telephone operator that an outgoing
2 call may be initiated. For example, call-originator **11** may lift the handset from the cradle
3 of telephone **13**, and receive an audible dial tone through the operation of dial tone
4 generator **27** and central office **23**.

5
6 After call-originator **11** dials the telephone number of call-receiver **15**, ring
7 generator **29** at central office **23** generates a plurality of ring signals which are sent
8 through switching network **21** to telephone **17** to alert call-receiver **15** that a call is
9 incoming. Once call-receiver **15** lifts his or her handset off of the cradle of telephone **17**,
10 voice path **31** is established between call-originator **11** and call-receiver **15**.

11
12 In accordance with current Bell standards, caller-identification information may be
13 transmitted, automatically, between call-originator **11** and call-receiver **15**, through
14 telephone network **9**, in a manner which will be described below with reference to
15 **Figures 12a, 12b, and 12c**. In the United States of America, in accordance with the
16 Bellcore Specification No. 220, the transmission must occur between the first and
17 second rings. In **Figure 12a**, such caller-identification information signals transmitted to
18 call-receiver **15** are depicted in simplified form, with caller-identification information **39**
19 occurring between first ring **35** and second ring **37**. The Bellcore Specification requires
20 that caller-identification information **39** occur at least 500 milliseconds after first ring **35**
21 ceases. Thus, the signal which represents the caller-identification information will begin
22 transmission one-half of one second, or longer, after the termination of first ring **35**.
23 Caller-identification information **39** is transmitted serially, utilizing a frequency-shift-
24 keying technique, which is well known in the prior art.

25
26 The Bellcore Specification also requires that the transmission of caller-
27 identification information **39** end at least 427 milliseconds prior to the commencement of
28 second ring **37**. Typically, there is a four second interval between first ring **35** and
29 second ring **37**, so a significant amount of time is available for the communication of

1 caller-identification information. Altogether, there is available a period of 2,570
2 milliseconds for the transmission of caller-identification information, not including pauses
3 required by the Bellcore Specification (such pauses or periods of silence are required at
4 the beginning and end of the message). At 1,200 baud, this message interval is
5 sufficient to transmit 3,084 bits, or 308 bytes.
6

7 The blocks of data which make-up the caller-identification information **39** is set
8 forth in block diagram form in **Figure 12b**. The first component of the caller-identification
9 information is a synchronization signal **41** which comprises a channel seizure signal
10 having a duration of 250 milliseconds of frequency-shift-keying encoding of a bit pattern
11 of alternating zeros and ones. Such a synchronization signal is utilized to provide a
12 recognizable pattern to alert applicable caller-identification decoding equipment that
13 caller-identification information follows. Pre-message pause **43** follows synchronization
14 signal **41**, and has a duration of 150 milliseconds, plus or minus 25 milliseconds. The
15 purpose of such a pre-message pause **43** is to condition the receiver for the data which
16 follows.
17

18 Next, message-type identifier **45** follows synchronization signal **41**. Message type
19 identifier **45** is typically one byte of data which identifies the type of caller-identification
20 message which is being sent. There are two basic types of caller-identification
21 messages, including: (1) only numeric data, which identifies the telephone number for
22 the source of the telephone call; and (2) numeric data, which identifies a telephone
23 number for the source of the telephone call, along with hexadecimal representation of
24 alphabetic characters that contain the directory name associated with the telephone
25 number of the source telephone. In accordance with the Bellcore Standard, 04
26 hexadecimal identifies a single message caller-identification message, while 80
27 hexadecimal identifies a caller-identification message which includes both a telephone
28 number and a name.
29

1 Next, message byte count **47** provides an indication of the total length of the
2 caller-identification information. This is important because the directory name associated
3 with the source telephone number will have a different length for each particular name.
4

5 Thereafter, sub-message type **49** identifies the type of submessage which is
6 transmitted with the caller-identification information. Sub-message link **51** identifies the
7 length of the sub-message which follows.
8

9 Message **53** consists of information which is described in more detail below with
10 respect to **Figure 12c**. Message **53** is followed by checksum byte **55** which, in
11 accordance with the prior art techniques, provides a checksum total to ensure that data
12 received has not been lost or altered in any way during the transmission. The receiving
13 unit of a caller-identification decoder generates a checksum in response to the entire
14 caller-identification bit stream, and thereafter compares this checksum with checksum
15 byte **55**. If these checksums match, then no bits were lost in the transmission; however,
16 if the checksum generated by the caller-identification decoder does not match checksum
17 byte **55** received at the decoder, then one or more data bits may have been lost in the
18 transmission, and the information may be unreliable or unusable.
19

20 The final component of a caller-identification message is post-message pause
21 **57**, which is a quiescent period prior to second ring **37** of **Figure 12a**.
22

23 With reference now to **Figure 12c**, message **53** will be described in greater
24 detail. The first eight bits of the message include month bits "MM", day bits "DD", hour
25 bits "HH", and minute bits "MM". These eight bits provide the month and date, along with
26 the hour and minute, in military time, of the telephone call. Note that no information is
27 provided regarding the year.
28

29 The next portion of message **53** is either (1) a ten digit telephone number, or (2)

1 a single digit which identifies that caller-identification information is either (a) not
2 available, or (b) has been blocked to maintain the caller's privacy.

3
4 If caller-identification information is not available, the ASCII character "0" is
5 transmitted. If the caller-identification information has been blocked for reasons of
6 privacy, the character P is transmitted. However, if the caller-identification information is
7 neither unavailable nor blocked, then a ten digit bit stream follows. The first three bits,
8 "AAA" identify the area code; the next three bits, "PPP", identifying the prefix; and the
9 final four bits, "EEEE", identify the exchange. For example, if the source phone number
10 is 702-731-1113, then AAA = 702, PPP = 731, and EEEE = 1113.

11
12 The next portion of message 53 is caller-identification information which identifies
13 the name associated with the particular preceding telephone number. If this information
14 is unavailable, a single character "0" is provided. If this information is blocked for
15 reasons of privacy, a single character "P" is provided. However, if this information is both
16 available and not blocked, a multi-bit string follows which sets forth a name associated
17 with the particular preceding telephone number (for example, "John Doe").

18
19 Therefore, considered broadly, caller-identification information may be solely data
20 which identifies a telephone number associated with the telephone unit utilized to place
21 a call, or the telephone number associated with the telephone unit utilized to place the
22 call in combination with alphabetic characters identifying a name associated with that
23 particular number in a telephone directory (i.e., a telephone directory data base). In
24 either event, whether the directory name is provided or not, this information can be
25 considered to be the "caller-identification information." The particular details of the
26 caller-identification standards in the United States of America are set forth in the
27 publications of the Bell Communications Research Laboratories, which are identified as
28 "Bellcore", and include (1) Technical Reference No. TR-TSY-00032, issued November
29 1, 1986, and entitled "CLASS(sm) Feature: Bulk Calling Line Information"; (2) Technical

1 Reference No. TR-TSY-000030, issued January 1, 1990, entitled "CLASS(sm) Feature:
2 Calling Number Delivery"; and (3) Technical Reference No. TANWT-001188, issued
3 March 1, 1991, entitled "CLASS(sm) Calling Name Delivery and Related Features
4 Generic Requirements"; all of which are incorporated herewith by reference as if fully set
5 forth.
6

7 **Figure 13** depicts one embodiment wherein numeric paging network **61** is utilized
8 to receive caller-identification information via interaction with telephone network **9** in
9 response to call-originator **11** communicating through telephone network **9** with central
10 office **59** of numeric paging network **61**. In this configuration, numeric paging network **61**
11 may be utilized to transmit the numeric portions of caller-identification information, and
12 not the alphanumeric portions. **Figure 13** includes telephone network **9**, which includes
13 components identical to those discussed above in connection with **Figure 11**, with the
14 only difference being that a page request telephone call is received by call receiver **15**,
15 which is located within numeric paging network central office **59**. Between the first and
16 second rings received by call receiver **15**, the caller-identification information is routed
17 through telephone **17** to decoder **63**.
18

19 Decoder **63** comprises a conventional caller-identification decoder capable of
20 receiving the frequency-shift-keyed caller-identification signal, and decoding it into a bit
21 stream representative of the information described above in connection with **Figures**
22 **12b** and **12c**. The portion of information corresponding to the telephone number of
23 particular telephone **13** being utilized by call originator **11** is provided as an input to
24 decoder **63**. Additionally, telephone **17** is utilized to receive any optional numeric
25 message which is input by call-originator **11** and transmitted over voice path **31** during
26 the time interval provided.
27

28 The decoded numeric information which corresponds to the telephone number of
29 the telephone utilized by call-originator **11**, and any numeric message input by call-

1 originator **11**, are assembled in message buffer **65**, which pushes the serial bit stream to
2 transmitter **67** in accordance with a predefined protocol. The inventions may utilize the
3 predefined communication protocol identified as the Post Office Code Standardization
4 Advisory Group (POCSAG) code. Such a code comports with the formats provided by
5 the International Committee CCIR, which has standardized message coding for radio
6 frequency transmissions. Both the POCSAG code and CCIR standards are well known
7 by those skilled in the art, and both are incorporated herein by reference as if fully set
8 forth, but are not essential to the main concepts of the preferred embodiments.

9
10 Transmitter **67** provides a radio frequency communication link **69** which
11 communicates information from numeric paging network central office **59** to personal
12 communication device **71**. Personal communications device **61** may be a receive-only
13 device, such as a paging device, or a more sophisticated bi-directional communication
14 device, such as a personal communication device or personal digital assistant, such as
15 the personal digital assistant sold under the trademark " Macintosh Newton" by Apple
16 Computer, or the product sold by AT&T under the trademark "EO". Preferably, personal
17 communication device **71** at least includes display **73**, which is utilized to display
18 information based, at least in-part, upon information contained within a database
19 resident within personal communication device **71**, or in-part upon information
20 transmitted over radio frequency communication link **69** from central office **59** of numeric
21 paging network **61**.

22
23 **Figure 14** provides a block diagram representation of another embodiment
24 wherein alphanumeric paging network **75** is utilized to receive caller-identification
25 information. Such caller-identification information which may be received includes
26 numeric information corresponding to the telephone number of telephone **13** utilized by
27 call originator **11** to engage alphanumeric paging network **75**, and alphanumeric text
28 which identifies the "entity" listed in a telephone directory (i.e., a database) as the owner
29 of the particular telephone number assigned to telephone **13**. Call-receiver **15** receives

1 the incoming call through switching network 21 on behalf of alphanumeric paging
2 network 75. Call-receiver 15 is located within alphanumeric paging network central office
3 77.
4

5 The caller-identification information is routed from telephone 17 to decoder 79,
6 where it is converted from the frequency-shift-key format transmitted within telephone
7 network 9, to an acceptable binary or hexadecimal format. Such decoded caller-
8 identification information includes numeric caller-identification information which
9 corresponds to telephone 13 utilized by call-originator 11 to engage alphanumeric
10 paging network 75, as well as alphanumeric textual information which identifies the
11 "entity", as listed within the telephone directory database, which has ownership of that
12 particular telephone number, along with other additional formatting information which
13 was described above in connection with **Figures 12a, 12b, and 12c.**
14

15 This decoded caller-identification information is pushed from decoder 79 to
16 message buffer 81, and may also be provided to automated checking routine 83.
17 Automated checking routine 83 receives caller-identification information and formulates
18 a textual or synthesized voice query, which may then be utilized to communicate with
19 call-originator 11 to verify the telephone number for telephone 13 (which was derived
20 from the caller-identification information) as well as the "entity" identity (which was also
21 derived from the caller-identification information). The query may include the following
22 questions:
23

24 (1) The caller-identification information provided to us through the telephone
25 network indicates that the telephone number from which you are placing this call is AAA-
26 PPP-EEEE; please depress your telephone key pad number "1" if this information is
27 correct, or depress telephone key pad "2" if this information is incorrect.
28

29 (2) Your previous response has indicated to us that the telephone number

provided through the caller-identification is incorrect. Please enter your correct telephone number at this time beginning with the area code.

(3) The caller-identification information provided to us through the telephone network indicates that this telephone number is assigned to "NNNNNNNN"; please depress "1" if this information is correct. If this information is not correct, please hold for an operator.

(4) Please stand by for an operator if you desire to leave a detailed message; otherwise, please hang-up and your page will be directed to the intended recipient which you should now identify by depressing the keys on your telephone key pad, with the area code being entered first.

(5) If no detailed message is desired, hang-up and your page will be directed to area code "AAA", telephone number "PPP-EEEE". Thank you.

After this automated verification of the caller-identification number occurs, human operator **85** may be made available to call-originator **11** to take a detailed alphanumeric textual message. Human operator **85** keys a particular message into message buffer **81** prior to transmission of the message by transmitter **87**, via radio frequency communication link **89**, to remotely located personal communication device **91** which includes display **93**. Upon receipt of the page, personal communication device **91** generates information for display in display **93** based at least in part on at least one of: (1) information communicated via radio frequency communication link **89**; or (2) information contained within a database maintained within personal communication device **91**.

While **Figures 13** and **14** have been described with reference to a numeric paging network and an alphanumeric paging network, the preferred embodiments may

1 be utilized with an alphanumeric paging network which allows for communication of a
2 variety of page-originator generated messages, in a variety of formats. Such messages
3 may be provided to the portable personal communication device in a variety of formats,
4 including:

5
6 (1) textual information which include either numeric only, or alphanumeric
7 data; .

8
9 (2) digitized voice or audio information which may be communicated in analog
10 form through the telephone network to the central office of the alphanumeric paging
11 network, where the information is then digitized, and transmitted in a digital format
12 which, upon reception, may be reconstructed to define an analog voice or audio signal
13 which drives an audio output device resident in the personal communication device; or

14
15 (3) digitized image information, such as a video image or an iconographic
16 representation of information, which may be transmitted over the voice channel of the
17 telephone network and received at the central office of the alphanumeric paging
18 network, where it is then digitized, and transmitted to the remotely located personal
19 communication device, where the digital information is reconstructed into an image
20 which may be displayed on a display resident in the personal communication device.

21 Given this variety of message-format inputs, the personal communication device
22 can provide an equally impressive array of display options. Textual input (including
23 numeric and alphanumeric characters) can be displayed in a conventional manner on a
24 simple and relatively inexpensive alphanumeric LCD display. Additionally, text which is
25 provided as input to the personal communication device via the radio frequency
26 communication link, may be utilized with a voice synthesizer to provide synthesized
27 voice as an output from an audio output device resident in, or coupled to, the personal
28 communication device.

1 Alternatively, an alphanumeric or numeric input supplied to the personal
2 communication device may be utilized to recall one of a plurality of prestored audio
3 output messages. For example, a table may be provided which identifies particular
4 alphanumeric codes as corresponding to particular audio output messages. The binary
5 characters "1111" may correspond to the audio output message "phone home now".
6 Alternatively, a different code, such as "001," may correspond to the audio output
7 message "phone your office now". The prerecorded and predetermined audio output
8 messages may define a plurality of messages which alert the page-receiving
9 communicant that a page has been received from a particular source, and indicating a
10 particular urgency or requesting a level of diligence in response thereto.

11
12 Of course, as another option, digitized audio or voice data may be reconstituted
13 into analog format to provide an audio output corresponding almost directly to the audio
14 input provided by the page-originating communicant over the telephone lines to the
15 central office of the paging network.

16
17 Digitized images may also be transmitted to the personal communication device
18 in this manner for display on a more elaborate display, such as a personal computer-
19 type display. Finally, digitized audio may be provided as an input to the personal
20 communication device, which, in turn, may be utilized to generate a combination of
21 signals, which may include an audible signal, or a preselected image, such as an icon,
22 which may be placed on the display.

23
24 **Figure 15** provides one example of the utilization of a numeric message code,
25 which is input at the personal communication device, to generate a textual message
26 which provides, to the page-receiving communicant, information which allows him or her
27 to respond in an appropriate manner to the page. As is shown in **Figure 15**, the
28 message code number column on the left corresponds to a textual message code on
29 the right. Receipt of the "**1" message code results in the display of the message "call

1 when you return" on the personal communication device. The receipt of the message
2 code "**2" results in the display of the textual message "voice mail received" on the
3 personal communication device. Receipt of the "**3" message code results in the display
4 of the textual message "fax mail received" on the personal communication device.
5 Receipt of the "**4" message code results in the display of the textual message
6 "electronic mail received" on the personal communication device. Receipt of the "**5"
7 message code at the personal communication device results in the display of the textual
8 message "image data received". Receipt of the "**6" message code results in the display
9 of the textual message "other data received" on the personal communication device.
10 Finally, receipt of the "**911" message code at the personal communication device
11 results in the display of the textual message "call immediately".

12
13 Of course, other various preselected and predefined textual messages are
14 possible. To facilitate the use of this system, the paging network may provide a
15 synthesized-voice and keypad driven exchange between the call-originating
16 communicant and the central office of the paging network. Such an interface may be
17 utilized until the various page-originating communicants learn one or more of the most
18 useful message codes. After such message codes are learned, a user may thereafter
19 bypass the synthesized-voice menu. Preferably, the information provided to the page-
20 receiving communicant is stored in memory within the personal communication device
21 for review at a later time. Typically, the personal communication device includes
22 memory buffers sufficient to hold a selected number of messages received via the
23 paging network, and other corresponding data.

24
25 **Figure 16** provides a view of one way in which the data received from the page-
26 originating communicant may be organized. Such organized data may be stored at
27 either the central office of the paging network or within the memory allocated for such
28 purpose within the personal communication device. As illustrated, a plurality of locations
29 are provided for storing caller-identification information (i.e., locations in the first

column), DTMF data which may be entered by the page-originating communicant by utilizing the telephone handset (the second column), and caller message data which may be provided by the page-originating communicant through utilization of a variety of messaging techniques, but in this example, an alphanumeric messaging technique, such as that discussed above with respect to **Figure 15**.

Figures 17, 18, 19a, 19b, and 19c provide views of three alternative physical configurations for the personal communication device. Personal communication device **101** of **Figure 17** allows for two-way communication with the paging network. Personal communication device **101** includes display **103**, which is preferably a display of the type utilized in portable personal computers, such as notebook computers. Display **103** may be utilized to display information, such as caller-identification information **105**. Caller-identification information **105** may include an alphabetic identification of the name associated with the telephone number transmitted with the caller-identification information, or may include optional message **107** input by the page-originating communicant during the request for a page via the telephone network.

In **Figure 17** is shown telephone number data **108** extracted from data shown as in **Figure 22** which is displayed on display **103**.

As is shown, other information **109**, such as an address or a phone number **108** associated with the page-initiating communicant **105**, may be retrieved from a database in the memory of the personal communication device and displayed along with the caller-identification information on display **103**.

Personal communication device **101** of **Figure 17** also includes keyboard **111** and graphical pointing device **113**, such as a touch pen, which may be utilized to select icons, menu buttons, or other items displayed in a graphical user interface. Preferably, personal communication device **101** allows two-way communication, and includes a

1 cellular link to the telephone network and/or paging network. Additionally, data card **115**
2 may be provided to load personal communication device **101** with a preconfigured
3 database containing information pertaining to parties with which frequent communication
4 may occur.

5
6 **Figure 18** provides a view of an alternative personal communication device **117**,
7 which allows only one-way communication; personal communication device **117** may
8 receive information from the paging network, but may not directly originate an outgoing
9 communication with the telephone network, or with the paging network. As is shown,
10 personal communication device **117** includes display **119**, which may display
11 identification **121** of the page-originating communicant, along with his or her address.
12 Telephone field **123** is also provided for displaying a telephone number at which the
13 page-originating communicant may be reached. Furthermore, short message **125** may
14 be provided to indicate either (1) the type of information which has been received at the
15 paging network, or (2) the degree of urgency attached to the particular information
16 received.

17
18 Data card **127** may be utilized to load personal communication device **117** with
19 additional database information. In the preferred embodiment of the present invention,
20 the information displayed in display **119** is based at least in-part upon caller-
21 identification information, and at least in-part upon information recalled from the
22 database resident in the memory of personal communication device **117** or within data
23 card **127**. As is shown in **Figure 18**, keyboard **129** is provided to allow the page-
24 receiving communicant a means to enter or manipulate data within the database.

25
26 A third, and still different, embodiment of the present invention is depicted in
27 **Figures 19a, 19b, and 19c. Figure 19a** provides a view of the bottom portion of
28 personal communication device **131**. Note that audio output device **133** is provided.
29 Mechanical coupler **135** provides a means for acoustically coupling personal

1 communication device **131** to any telephone equipment, particularly the mouthpiece of a
2 telephone handset, against which audio output device **133** is disposed.

3
4 In Figure 19a data connector 134 and battery cover 132 is shown.
5

6
7 **Figure 19b** provides a side view of personal communication device **131** of
8 **Figure 19a**. Note that RJ11 telephone jack power switch **137** is provided to connect the
9 telephone line to personal communication device **131** .
10

11 **Figure 19c** provides a view of the top portion of personal communication device
12 **131**. Display **139** is provided to receive and display numeric data, alphanumeric data,
13 and images. A plurality of icons **141** are provided about display **139**, each of which is
14 dedicated for the communication of particular information. For example, icon **143** is
15 representative of a clock, and may be utilized to indicate to the page-receiving
16 communicant that time-sensitive information has been communicated to the paging
17 network. For an alternative example, icon **145**, which depicts a telephone, is provided to
18 indicate to the page-receiving communicant that a telephone message has been
19 received by the paging network. A variety of other dedicated iconographic
20 representations are provided about display **139**, each of which is dedicated to
21 communicate particular, predefined information to the page-receiving communicant
22 pertaining to information deposited at the paging network. In Figure 19c icon 144 is
23 shown which initiates a recording mode for receiving sound signals from sound input
24 102 for alert annunciation, and other customized audible notification events.
25

26 Cursor movement keys 147 of Figure 19c may be used to selectively move
27 through messages received or data contained within a personal communicator device.
28 Computer icon 142 of Figure 19c may be utilized to initiate a data communication
29 session for data transfer with another computing device. Calendar icon 140 can be

1 used for display and manipulation of calendar functions. Appointment book icon 146
2 can be used to view and manipulate appointment data.

3
4 The device depicted in **Figures 19a, 19b, and 19c** allows only the receipt of
5 information from the paging network, and utilizes the dedicated icons to communicate
6 particular types of information to the page-receiving communicant. This allows the small
7 display **139** to be utilized for less-routine types of information.

8
9 **Figure 20** provides a block diagram view of portable communication device **201**.
10 As is shown, portable communication device **201** includes central processing unit **203**,
11 which preferably comprises a microprocessor. The microprocessor of central processing
12 unit **203** interacts with the plurality of hardware and software components. Key pad input
13 unit **231** communicates with central processing unit **203** to allow for the operator to
14 depress particular keys on a keyboard thereby inputting data into portable
15 communication device **201**. Receiver unit **233** is utilized to receive radio frequency
16 communication from the paging central office. Decoder unit **235** is utilized to decode
17 radio frequency signals received from receiver unit **233**. Decoder unit **235**
18 communicates with central processing unit **203** to power-up central processing unit **203**
19 when a page notification intended for portable communication device **201** is received at
20 receiver unit **233**. ID-ROM **237** is utilized to record in memory a particular numeric or
21 alphanumeric identifying information which is provided to code each particular portable
22 communication device in a paging network so that it is responsive to a particular radio
23 frequency transmission. ID-ROM **237** records the particular identification code assigned
24 to that particular communication device.

25
26 Central processing unit **203** communicates through display buffer **205**, in a
27 conventional manner, to place numeric data, alphanumeric data, and images, such as
28 icons, on display unit **207**. Light-emitting-diode **211** is provided to provide a flashing
29 indication of the receipt of a page. LED driver **209** is positioned intermediate central

1 processing unit **203** and LED **211**, to allow central processing unit **203** to drive LED **211**
2 in a variety of flashing patterns. Sound-signal generating unit **213** is coupled between
3 central processing unit **203** and audio output device **215**. Central processing unit **203**
4 provides binary control signals to sound-signal generating unit **213** which result in the
5 output of a particular tone, at a particular volume and a particular frequency. DTMF
6 signal generating unit **217** is coupled between central processing unit **203** and audio
7 output device **215**. It is utilized, when desired, to generate dialing tones which may be
8 communicated through audio output device **215** to the mouthpiece of a telephone to
9 place a call utilizing the telephone network. Buffer **219** is coupled to central processing
10 unit **203** and DTMF signal generating unit **217**, and is provided for queuing of DTMF
11 generating signals. Voice processing unit **221** is coupled to central processing unit **203**
12 to allow the analog-to-digital and digital-to-analog conversion of speech and other audio
13 input 102 of Figure 7 and 102 of Figure 9c or output 133 of Figure 7 and 133 of Figure
14 9a.

15
16 Several housekeeping functional blocks are also provided in the view of **Figure**
17 **20**. RAM **229** is provided as a memory cache. In the preferred embodiment of the
18 present invention, a database including a plurality of fields which identify actual or
19 potential communicants by name, address, and appropriate telephone and facsimile
20 numbers, is resident within RAM **229**. Character generator **225** communicates with
21 central processing unit **203** to generate particular alphanumeric characters in response
22 to commands from central processing unit **203**. MAC/PC download memory **227**
23 operates a data exchange buffer to allow for the communication of data between central
24 processing unit **203** and personal computer **239**. Personal computer **239** may be utilized
25 to store in memory the database which is intermittently downloaded through MAC/PC
26 download memory **227** for storage in RAM **229**. Hardware communication interface 202
27 of Figure 20 allows for data uploading and downloading between personal computer
28 **239** and a portable communication device 201. As is shown in **Figure 20**, personal
29 computer **239** is coupled in a node mail network which allows for voice mail service

(VMS), fax mail service (FMS), electronic mail service (EMS), paging system (PS), images, and connection to information services. Communication link 218 allows for communication between a personal computer message center device 239 and information sources referred to as node mail 204 utilizing the telephone network. Such information sources include voice mail services (VMS) 216, electronic mail services (EMS) 214, fax mail services (FMS) 212, image mail (IMAGE) 208 and information services (INFO SVCS) 206 which may be received at personal computer 239 over the communication link 218. Additionally shown is paging service (PS) 210 which can receive outbound communication over communication link 218 from personal computer 239.

Figure 21 provides a flowchart representation of the technique in accordance with the a preferred embodiment for communicating information between a page-originating communicant and a page-receiving communicant. The process starts at software block **251**, wherein the page-originating communicant (user) utilizes the telephone network to access an automated data entry system. As discussed above, upon establishment of a voice circuit between the telephone unit utilized by the page-originating communicant and the paging center, the caller identification information, if any exists, is automatically transferred to the central office, where it is decoded and preferably utilized in accordance with software block **255** in a recorded menu exchange, wherein the information is verified and/or corrected and/or supplemented.

In software block **257**, the page-originating communicant enters optional data. This optional data may be numeric data, alphanumeric data, digitized speech, facsimile messages, or images. In accordance with software block **259**, the paging system identifies when the data entry has been completed, and confirms the data entry in accordance with software block **261**. In accordance with software block **265**, the paging network verifies the data, preferably by displaying it or otherwise making it available to the page-originating communicant. In accordance with software block **263**, the page-

1 originating communicant hangs-up, and then, in accordance with software block **267**,
2 the data, including the caller-identification information and any optional or other data
3 attached to the page information, is transmitted via radio frequency communication link
4 **269** to portable communication device **271**.

5
6 The most common application of a preferred embodiment requires that the page-
7 originating communicant enter either numeric or alphanumeric data which is identified
8 with the caller-identification information. Upon receipt by portable communication device
9 **271**, at least one of either the numeric caller-identification information, or the alphabetic
10 caller-identification information, or the optional data entered by the page-originating
11 communicant is compared to one or more data fields in a database which is maintained
12 within memory (preferably RAM **229** of **Figure 20**) of portable communication device
13 **271** (of **Figure 21**).

14
15 **Figure 22** depicts one example of such a database. As shown, there are five
16 data fields associated with each entry: a telephone number field, a fax number field, a
17 name field, an "other data" field (preferably utilized for addresses) and a notification type
18 and intensity field.

19
20 In one particular embodiment of the present invention, the numeric or
21 alphanumeric data entered by the page-requesting communicant is compared to an
22 appropriate data field. For example, if the page-originating communicant entered
23 numeric telephone data as part of the page request, this numeric telephone data is
24 compared to numeric data fields which are representative of telephone numbers in order
25 to determine if one or more matches exist. If a match exists, it is probable that the page-
26 requesting communicant is the entity identified in an associated data field. For example,
27 if a telephone number is entered in the page request which corresponds to the first
28 number in the database, it is highly likely that Mr. Hashimoto, the first name in the
29 database, is the page-originating communicant.

1
2 The caller-identification information is also compared with one or more data fields
3 in the database. In one specific embodiment, numeric telephone data from the caller-
4 identification information is compared to numeric fields which represent telephone
5 numbers, in order to determine if one or more matches exists. If no matches exist, it is
6 highly likely that Mr. Hashimoto is calling from a telephone which is not ordinarily
7 associated with him. The page-receiving communicant can then decide to either return
8 the call immediately, or defer it to a later time. In this event, the page-receiving
9 communicant knows that Mr. Hashimoto is the likely page-originating communicant, and
10 that he can be reached at this particular time at the number identified in the caller-
11 identification information. In this manner, a protocol can be devised which automatically
12 access one or more of: (1) numeric or alphabetic characters that are located within the
13 caller-identification signal; and/or (2) numeric or alphanumeric characters entered by the
14 page-originating communicant into one or more data fields, in order to identify the likely
15 identity of the page-originating communicant, and to further to identify whether the likely
16 page-originating communicant is calling from a familiar telephone or an unfamiliar
17 telephone.

18
19 In instances where the caller-identification information fails to produce a match,
20 the page-receiving communicant may be provided with a particular type of notification to
21 indicate that a person is contacting him or her, or attempting to contact him or her, and
22 such a person is not listed within the database at this time. This may prompt the owner
23 of the personal communication device to utilize a key pad or alternative means to enter
24 that entity upon return of the telephone call.

25
26 The notification type field is interesting, insofar as it is user configurable, allowing
27 the page-receiving communicant to identify a particular type, or subtype, of paging
28 notification with one or more particular likely communicants. For example, LED displays
29 from LED 201 (of **Figur 20**) may be utilized to identify work associates, while audio

1 tones emitted from audio output device **215** (of **Figure 20**) may be utilized to indicate
2 that friends or family are attempting to notify the page-receiving communicant.

3
4 Preferably, the user may establish intensity levels or sequence levels for
5 particular types of page alert notifications. For example, the notation "VI" indicates a
6 visual indication with a high intensity. In contrast, the notation "BL" may denote a beep
7 (that is, audio output) of a low intensity. Still, in further contrast, the notation "T" may
8 identify that, for this particular potential communicant, only textual messages should be
9 utilized to identify receipt of the page. In this hierarchical structure, the entity which is
10 assigned the "T" notification type and intensity, is a fairly low priority potential
11 communicant, while the communicant which has the "VI" notification type and intensity
12 indicator identified therewith is a relatively high priority communicant. In this manner, the
13 page-receiving communicant may be able to prioritize his or her return phone call
14 activities.

15
16 A variety of mechanisms by which the owner of the portable communication
17 device may enter data, revise data, or review data are depicted graphically in **Figures**
18 **23, 24, 25, and 26.**

19
20 **Figure 23** depicts a portable communication device with a detachable input
21 interface, such as keyboard **301**, which releasably connects through connector **303** to
22 paging receiver **307**. Display **305** is also included in paging receiver **307**. Paging
23 receiver **307** also includes pager operation switches **309**. The owner of this paging
24 device may selectively releasably connect keyboard **301** to paging receiver **307**, and
25 then depress one or more keys on keyboard **301** to enter data at a cursor location which
26 is presented within display **305**. This device stands in sharp contrast with the device of
27 **Figure 24**, which includes keyboard **311** that is substantially permanently coupled to
28 paging receiver **313**. Paging receiver **313** also includes display **315**. Paging receiver **313**
29 preferably includes pager operation switches **317**. The operator may utilize keyboard

1 **311** to enter or modify data within display **315**. More particularly, the operator may utilize
2 keyboard **311** to add or modify data contained in the plurality of fields of the database
3 maintained within the memory of the portable communication device.
4

5 **Figure 25** provides yet another alternative embodiment contemplated . As is
6 shown, paging receiver **321** is provided, and can be selectively and releasably coupled
7 to personal computer **327** via a serial hardwire line, a parallel hardwire line, an infrared
8 link, or a radio frequency link. Personal computer **327** may be utilized to create and
9 maintain the database with a plurality of data fields, including such fields as
10 communicant's name, communicant's telephone number, communicant's fax number,
11 communicant's address, and a field containing an operator-selectable notification
12 attribute or type. Such data may be intermittently transferred between personal
13 computer **327** and paging receiver **321**, and maintained within a random access
14 memory within paging receiver **321**.
15

16 Paging receiver **321** includes display **323** and pager operation switches **319**,
17 which allow for conventional paging functions. In this embodiment, the data contained
18 within the database of paging receiver **319** is periodically refreshed by the owner by
19 conducting memory dumps from personal computer **327** to paging receiver **321**. Upon
20 receipt of a page notification, the caller identification information and/or optional data
21 input by the page-originating communicant is compared with one or more fields of the
22 database contained within the memory of paging receiver **321**.
23

24 **Figure 26** provides a view of yet another alternative embodiment contemplated in
25 the present invention. In this system, a very inexpensive paging unit, with limited display
26 capabilities, includes a memory for the receipt of the database with a plurality of data
27 fields including communicant's names, communicant's phone numbers, communicant's
28 fax numbers, communicant's addresses, and any user-selected notification attribute
29 identified to that particular communicant. The communication is periodically dumped in a

1 methodical fashion from personal computer 329 via wireless infrared communicator 331
2 to portable paging receiver 333.
3

4 **Figures 27 and 28** provide block diagram views of the software and hardware
5 components which facilitate the communication of the database between a computing
6 device, such as a personal computer, and the portable communication device. In
7 accordance with **Figure 27**, the personal computing device 401 includes operating
8 system 403, desktop application programs 405, data files 407, and intellect
9 communication software 409 which is resident in memory within the computing device,
10 and which is utilized in the transfer of information between computing device 401 and the
11 portable communication device 413, which includes download memory 419 which is
12 adapted to receive the database information. As is shown, the portable communication
13 device 413 may be connected via either hardware communication link 411, local infrared
14 communication 415, or remote telephone input 417. In **Figure 28**, a laptop architecture
15 is displayed for laptop 421, which includes operating system 423, personal information
16 manager 425, data files 427, PCMCIA interface 429 and communication software 431
17 which facilitates the transfer of information from the memory of the laptop computing
18 device 421 to the portable computing device 433.
19

20 **Figure 29** depicts yet another technique for entering and modifying data which is
21 present within the database present within the memory of the portable communication
22 device. As is shown, the page-receiving communicant inputs data on a physical form
23 435, which identifies communicant's names, communicant's telephone numbers,
24 communicant's fax numbers, communicant's addresses, and any associated notification
25 attribute for that particular communicant. Alternatively, information is provided via an
26 automated user input request system 437 which preferably utilizes either a portable
27 computing device, a stationary computing device, or a telephone to input data which is
28 to be communicated via radio common carrier 439 to paging transmitter 441, which
29 communicates via radio frequency communication link 443 to paging receiver 445. The

1 techniques for modifying the database are depicted in flowchart form in **Figure 30**. The
2 process starts at software block **451**, and continues at software blocks **452**, **453**, and
3 **454**, wherein data is either manually entered or automatically entered and routed
4 through software block **453**. In accordance with software block **455**, data is processed at
5 a radio common carrier, and transmitted to software block **457**, where it is determined
6 whether local programming is required, if so, the process continues at software block
7 **459**; if not, the process continues at software block **460**. In either event, data is
8 communicated to portable communication device **461** for creation, supplementation, or
9 modification of the database contained in memory in portable communication device
10 **461**. In accordance with the flowchart of **Figure 30**, software block requires that
11 message code cards be printed, and delivered in accordance with software block **458** to
12 a dealer or customer. The software steps associated with the utilization of these code
13 cards is depicted in flowchart form in **Figure 31**. In accordance with software block **465**,
14 the page customer receives the printed message card along with the pager at the
15 beginning of pager service. In accordance with software block **467**, the page customer
16 distributes the message cards to callers, and instructs them to fill the data fields in the
17 cards. In the flow of **Figure 31**, the cards are distributed to callers A, B, and C in
18 accordance with software blocks **469**, **471**, **473**. The callers consult their message
19 cards, and enter the code data, and transmit it through telephone office **477** to radio
20 common carrier **479**, which forwards it to paging transmitter **41**, which establishes a
21 radio frequency link with portable communication device **43**.

22
23 Figure 32 depicts a standardized message code card 609. Along with the
24 telephone number for the paging center 603. The card 609 of Figure 32 is shown. The
25 call receiving communicants pager ID number 605 identified, along with the telephone
26 number for the paging center 603. Then, a plurality of numeric or alphanumeric codes
27 are provided in field 601 for providing numeric or alphanumeric messages 607.

28
29 Figure 33 depicts a standardized message code card 615 with message 611

1 corresponding to message code. Additionally shown in phone data field 613 is a field for
2 entering data which corresponds to name data field also shown on message code card
3 615.
4

5 **Figures 32 and 33** depict two types of standardized message code cards. The
6 card of **Figure 32**, the call-receiving communicant's pager ID number 605 is identified,
7 along with the telephone number for the paging center 603. Then, a plurality of numeric
8 or alphanumeric codes are provided in a field 601, with an area to the right for providing
9 numeric or alphanumeric messages 607 which correspond to the numeric or
10 alphanumeric codes. For example, the numeric value "0" may corresponds to the
11 answer "no", while the numeric value "1" may correspond to the answer "yes". In the
12 view of **Figure 33**, an alternative standardized message code card is provided, which
13 provides alphanumeric or numeric characters with alphabetic textual messages. For
14 example, the numeric code "11" corresponds to the message "pick up the kids".
15 Additionally, the potential communicant can enter phone data and fax data in fields
16 which are dedicated for that purpose. This information is entered on a wide number of
17 cards by people who are likely to communicate with the paging subscriber. They are
18 mailed in or entered in by the potential communicants, to form a database which is
19 periodically communicated to the page receiving apparatus.
20

21 While the inventions have been shown in only one of its forms, it is not thus
22 limited but is susceptible to various changes and modifications without departing from
23 the spirit thereof. The above description is not intended to limit the meaning of the words
24 used in the following claims that define the invention. Rather, it is contemplated that
25 future modifications in structure, function or result will exist that are not substantial
26 changes and that all such insubstantial changes in what is claimed are intended to be
27 covered by the claims. While the inventions have been particularly shown and described
28 with reference to certain preferred embodiments, it will be understood by those skilled in
29 the art that various modifications in form and detail may be made therein without

1 departing from the scope and spirit of the inventions. Accordingly, modification to the
2 preferred embodiments will be readily apparent to those skilled in the art, and the
3 generic principles defined herein may be applied to other embodiments or applications
4 without departing from the scope and spirit of the inventions.